Five-Year Review Report

Pursuant to CERCLA

Third Five-Year Review Report
Northernaire Plating Superfund Site
Cadillac, Wexford County, Michigan

Prepared by:

U.S. Environmental Protection Agency
Region 5
Chicago, Illinois

In conjunction with:

Michigan Department of Environmental Quality
Lansing, Michigan

Approved By:

Richard C. Karl, Director
Superfund Division

Date 9/30/05

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Attachments

List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
ESD	Explanation of Significant Difference
GAC	Granular Activated Carbon
LDFA	Local Development Finance Authority
MCL	Maximum Contaminant Level
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PRP	Potentially Responsible Party
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SVE	Soil Vapor Extraction
TCE	Trichloroethene
UAO	Unilateral Administrative Order
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

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EXECUTIVE SUMMARY

The Northernaire Plating Superfund site is located in Cadillac, Michigan, in an industrial park approximately one square mile in area. Over 40 manufacturing plants, including the Northernaire Plating Superfund site (Northernaire site) as well as another Superfund site, the Kysor Industrial Corp. site, are located in the industrial park. The primary contamination of concern remaining at the Northernaire site is chromium contamination in groundwater. Groundwater samples from the City of Cadillac municipal well field, located 1300 feet northeast of the Northernaire site, have not shown hexavalent chromium or total chromium above detection limits since 2001. The chromium groundwater plume from the Northernaire site is not considered a probable threat to the municipal well field.

The Northernaire site was listed on the National Priority List (NPL) on September 8, 1983. The cleanup of the site included a removal action in 1983; a source control remedy (Operable Unit #1), implemented from 1988 to 1989; and an on-going groundwater remedial action (Operable Unit #2) that began in 1996.

The removal action in 1983 addressed disposal of containers, drums, and process wastes inside the building, decontamination of the building interior, and excavation and removal of a contaminated sewer line. Operable Unit #1 (OU1) focused on removing contaminated soil found on the site. The main component of Operable Unit #2 (OU2) is the extraction, treatment and monitoring of groundwater.

The remedy for the Northernaire site is protective of human health and the environment in the short term. No current exposure pathways exist and the remedy is functioning as planned. The soil removal in OU1 served to eliminate the risks associated with direct contact with, and ingestion of, contaminated soil. It also eliminated areas of significant soil contamination that would otherwise act as a continuing source of groundwater contamination and would work counter to the groundwater extraction and treatment system.

The OU2 groundwater treatment system is achieving discharge limits and performance standards for hexavalent and total chromium. For almost four years, since May 2001, the target cleanup level for hexavalent chromium (50 ug/l), as established in the OU2 Record of Decision (ROD), has been achieved in all ten compliance monitoring wells and in the groundwater extraction well. Six of the ten monitoring wells, as well as the extraction well, have been in compliance with the ROD cleanup level since the initial sampling date for each well, either 1996 or 1997. The groundwater extraction and treatment system began operating in 1996.

In the long term, to ensure that the remedy for the Northernaire site continues to be protective, institutional controls regarding use of private wells in a subdivision north of the site must be implemented. In addition, the capture zone of the extraction well must be verified to confirm that the achievement of cleanup levels is representative of the entire plume. Currently, there are data indicating that several extraction wells designed to remove volatile organics from groundwater may be capturing a portion of the chromium-contaminated groundwater. After it has been clearly demonstrated that the intent of the remediation is complete and the system is shut down, a monitoring plan will be established to ensure that cleanup objectives will continue to be achieved.

This is the third five-year review report for the Northernaire site. The report covers the Northernaire site only. A separate five-year review report was prepared for the Kysor Industrial Corp., site.

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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Northernaire Plating		
USEPA ID *(from WasteLAN)*: MID0020883609		
Region: 5	**State:** MI	**City/County:** Cadillac/Wexford County
SITE STATUS		
NPL status: Final		
Remediation status: On-going		
Multiple OUs*? Yes	**Construction completion date:** September 23, 1996	
Has site been put into reuse? No		
REVIEW STATUS		
Lead agency: USEPA Region 5		
Author's name: Mary Tierney		
Author's title: Remedial Project Manager	**Author's affiliation:** USEPA	

Review period:** 12/01/2004 to 9/302005
Date(s) of site inspection: April 26 and 27, 2005
Type of review: Post-SARA
Review number: Third
Triggering action: Second Five Year Review
Triggering action date ***(from WasteLAN)***: July 26, 2005
Due date ***(five years after triggering action date)***: July 26, 2005

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the five-year review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:
(1) Hexavalent chromium plume may not be fully captured by the extraction well. Part of plume may be being captured by one or more extraction wells designed to remove groundwater contaminated with volatile organic compounds (VOCs).

(2) Institutional controls do not extend into a neighboring subdivision in Haring Township where private wells still exist, and adequacy of current city ordinance in place to restrict groundwater use, well installation, and other activities that may compromise the remedial action has not been confirmed.

Recommendations and Follow-up Actions:
(1) To help determine area of capture, add chromium to the list of analytes for monitoring wells and extraction wells where the plume may have migrated beyond the capture zone. Re-evaluate capture zone analysis and/or design of extraction well if determined either or both would be useful. Test influent to air stripping towers for total chromium and hexavalent chromium.

If it is determined that chromium-contaminated groundwater is not being adequately captured, evaluate ways to address the issue and take appropriate actions.

If it is determined that chromium-contaminated groundwater is being adequately captured and compliance status is verified, prepare closure plan to cease operating the chromium treatment system.

(2) Prepare an Institutional Controls Study Plan to evaluate options for additional institutional controls and necessary modifications to existing institutional controls. Conduct an inventory of private wells to ascertain how many residences in the Township subdivision and other non-residential establishments in the area are not connected to the municipal water line and how many still have private wells. Document the uses of private well water. Determine if Haring Township has any means, such as the ability to pass an ordinance, to prohibit private well installation and place restrictions on groundwater use in the areas of the subdivision under which the plume may have migrated. Ensure that every effort is made to have as many residents as possible connect to municipal water and have their wells properly abandoned and sealed. In addition, the Institutional Controls Study Plan will evaluate the overall effectiveness of the institutional controls in place, as well as those that may be implemented in the future, to ensure long-term protectiveness of the remedy.

(Timeline for follow-up actions is shown in Table 6)

Protectiveness Statement(s):
The remedy at the Northernaire Plating site is protective of human health and the environment in the short term. Long-term protectiveness will be attained when it is confirmed that the current extraction system is capturing all groundwater containing hexavalent chromium above the 50 ug/l cleanup level, when institutional controls are in place to restrict groundwater use in the subdivision to the north of the site, and when the effectiveness of current and future institutional controls is confirmed.

Other Comments:
The OU2 ROD addressed the groundwater remedies at both the Northernaire and Kysor sites. A VOC-contaminated groundwater plume also being addressed by the ROD has not yet attained cleanup levels. In order for the entire remedy in the OU2 ROD to be protective of human health and the environment in the long-term, the Kysor portion of the remedy will have to satisfy the protectiveness criteria as well.

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NORTHERNAIRE PLATING SUPERFUND SITE
WEXFORD COUNTY, MICHIGAN
FIVE-YEAR REVIEW REPORT

I. INTRODUCTION

Authority and Purpose

The purpose of a five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and identify recommendations to address them.

EPA is preparing this five-year review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *[i]f the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

EPA interpreted this requirement further in the NCP. 40 CFR §300.430(f)(4)(ii) states:

> *[i]f a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

EPA, Region 5, conducted the five-year review of the remedy being implemented at the Northernaire Plating Superfund site in Wexford County, Michigan. This review was conducted by the USEPA Remedial Project Manager, Mary Tierney, with assistance from Scott Cornelius, Michigan Department of Environmental Quality (MDEQ), Central District, and James Skipper, MDEQ, Cadillac District, from December 2004 through September 2005. This report documents the results of the review. The final review report will be placed in the USEPA site files and at the local repositories for the Northernaire site at the Cadillac-Wexford County Public Library, 411 South Lake Street, Cadillac, Michigan, and the Cadillac City-Municipal Complex, 200 North Lake Street, Cadillac, Michigan. This is the third five-year review for the Northernaire Superfund site.

The triggering action for this statutory review is the last five-year review completed on July 26, 2000. This five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

II. CHRONOLOGY

Table 1: Chronology of Site Events

EVENT	*DATE*
Northernaire Plating, Inc., begins operation	1971
Hexavalent chromium detected in two private drinking wells approximately two blocks downgradient of Northernaire site	1978
MDNR orders Northernaire to conduct an RI/FS *but Northernaire states no funds are available*	1978
Northernaire ceases operation	May 1981
Children receive chemical burns from hazardous waste stored outside facility	1981
MDNR inspects site	July 19, 1982
USEPA and MDNR conduct emergency removal	July 1983 to August 1983
Final NPL listing	September 8, 1983
USEPA refers case to USDOJ for cost recovery	March 13, 1984
State-led, federally-funded RI/FS	1984 to 1985
State completes focused feasibility study	July 22, 1985
ROD (OU1) for source control signed	September 11, 1985
OU1 remediation	October/November 1988; March 1991
Court judgment granting all removal response costs	May 6, 1988
FS for Cadillac area groundwater completed	August 1988
ROD (OU2) for groundwater cleanup signed	September 29, 1989
Administrative Order (AO) for remedial design of OU2 signed	May 16, 1990
Explanation of Significant Difference (ESD) signed	March 3, 1994
Two separate Unilateral Administrative Orders (UAOs) for remedial action (RA) issued (Kysor Industrial Corp. and Four Winns/A.H. Joynt)	January 30, 1995
Third UAO for RA issued (Northernaire Plating)	April 11, 1995
On-site construction for OU2 begins	June 29, 1995
First five-year review completed	September 28, 1995
OU2 Remedial Action begins	1996
Second five-year review completed	July 26, 2000

III. BACKGROUND

Physical Characteristics

The Northernaire site is located on the northwestern corner of Sixth Street and Eighth Avenue, at 1002 Sixth Street, in Cadillac, Michigan (see Attachment 1, Figure 1). The site is about thirteen acres in area. The center of the City of Cadillac, which has a population of about 10,000, is about ½ mile to the southeast. The City of Cadillac is the county seat for Wexford County.

The plating facility that formerly operated on the Northernaire site consisted of a 100-foot by 50-foot prefabricated metal building on 12.75 acres of land. The building that housed the plating operations still stands, however, the interior is empty.

The Northernaire site is located in one of the City's industrial parks. In USEPA documents, the area has historically been referred to as the "Cadillac Industrial Park" or the "Cadillac Industrial Park Area." The Industrial Park is approximately one square mile in area and is generally bounded by Thirteenth Street to the north, Mitchell Drive (Route 131) to the east, Wright Street to the south, and Leeson Avenue to the west (see Attachment 1, Figure 2). Northernaire is located in the southwest quadrant of the Industrial Park.

In addition to more than forty manufacturing facilities, the Industrial Park also includes garages and storage areas for the City of Cadillac, the City of Cadillac municipal well field, and a number of private residences. The City of Cadillac municipal well field is 1300 feet northeast of the Northernaire site. Facilities in the Industrial Park that were issued one of the USEPA Unilateral Administrative Orders (UAOs) for remedial action (RA) for the Northernaire/Kysor sites were: Northernaire Plating, Four Winns' Cruiser Division, A.H. Joynt, and Kysor Industrial. Two other related sites identified as having trichloroethene (TCE) and/or other chlorinated solvents in either soil or sumps at their plants were the Four Winns' facility located on Frisbie Street and the Leo Ingraham property. Addressing the contamination at these two facilities was included in the work intended by the UAOs.

Of these facilities, Northernaire Plating was identified as the primary, and although not definitively demonstrated, is most likely the only source of the hexavalent chromium contamination in groundwater. The primary contaminants at the remaining facilities are volatile organic compounds (VOCs). The design and construction of the remedy for both the Northernaire site and the Kysor sites were conducted jointly, and the operation of the groundwater treatment system is being handled in this way also. There were a number of reasons this approach was taken, including the proximity of all the facilities and the commingling of the chromium and VOC plumes.

A number of other facilities in the Industrial Park are known or possible sources of groundwater contamination. The Paulstra/CRC plant and Mitchell Corporation are sources of groundwater contamination. Paulstra has completed the remediation of the plume of TCE due to releases at their facility, and Mitchell Corporation is in the process of addressing the (tetrachloroethene) PCE plume emanating from their property. The Rexair facility east of the Kysor site is responsible for a TCE plume which appears to extend into the subdivision to the north of the Cadillac Industrial Park. Features near the site and nearby facilities are shown in Attachment 1, Figure 3. Also, a diagram prepared by a contractor for MDEQ that depicts some of the plumes in the area, is in Attachment 1, Figure 4.

The closest surface water bodies to the site are the Clam River and Lake Cadillac. Both are approximately ¾ of a mile to the southeast. The effluent from the groundwater treatment facility discharges via an outfall to the Clam River. Some of the surface water drainage from the Industrial Park ends up in a water retention pond located near Leeson Avenue, the western boundary of the park; however, the majority of it flows south and east towards the Clam River.

Studies of the area have shown three distinct aquifers at or near the Northernaire site. The three aquifers are termed the "shallow," "intermediate," and "well field" or "deep" aquifers. The shallow and intermediate aquifers consist of sand with some silty clay and gravel. Clay layers separate the three aquifers from one another; however, it appears there may be some hydraulic connection between the shallow and intermediate aquifer north of the site. Contamination found in the deep, municipal well field aquifer indicates that it is also hydraulically connected to the intermediate and shallow aquifers. The clay layers between the aquifers appear to be absent in the vicinity of the City well field. The City wells draw from a deep, predominantly sand aquifer. Flows in the shallow and intermediate aquifers are generally to the north, with flow in the shallow heading more to the north-northeast and flow in the intermediate more to the northwest.

Land and Resource Use

The vicinity of the Northernaire site is predominantly industrial, but there are several residences, a trailer park, a baseball diamond and municipal garages also in the area. The land and resource use of primary concern near the site is groundwater that is used for drinking. The City of Cadillac municipal well field is about 1300 feet to the northeast. The well field includes seven municipal wells and is the sole community drinking water source for the City's 10,000 residents (see Attachment 1, Figure 5). In addition, the residential area to the north of the Industrial Park, commonly referred to as the North Park subdivision, is part of a neighboring town, Haring Township. A number of the residences in the North Park area obtain their drinking water from private wells in the intermediate aquifer.

The Clam River currently receives the effluent from the groundwater treatment facility. According to the application submitted to Michigan Department of Natural Resources (MDNR) for discharge limitations, the river is protected for the following uses: agricultural use, navigation, industrial water supply, cold-water fish, partial body contact recreation, and total body contact recreation. Currently, the main uses are industrial water supply and sport fishing.

Site Characteristics and History of Contamination[1]

The Northernaire plant was a former plating facility that operated from 1971 to 1981. Northernaire Plating provided custom chrome and nickel plating services to automobile manufacturers and other industries. Types of electroplating at the plant included flash chrome, hard chrome, bright nickel, bright chrome, sulfonate nickel, black oxide, and rack and barrel zinc. As at many other plating facilities, wastes at Northernaire included metal complexing agents, acids and heavy metals. No historical records or reports indicated use of significant amounts of solvents at the Northernaire facility. During the 1983 USEPA removal action, wastes removed from the site included: 3,450 gallons of acids; 5,402 gallons of cyanide wastes; 160 drums of cyanide wastes; and 5,000 gallons of waste hypochlorite solution.

The waste handling practices at the facility that led to the release of hazardous waste to surrounding soil and to area groundwater included the discharge of process wastes to a poorly-sealed private sewer line, as well as direct discharge to drywells. Specifically, from 1971 through 1978, when MDNR revoked its permit, Northernaire discharged waste waters containing

[1] An expanded Chronology of Site History appears in Attachment 2.

cadmium and chromium to a private line that led to the municipal sewer system. The poorly-constructed and inadequately-sealed underground pipes leading from the facility to the municipal line allowed waste to be discharged directly to the ground. A drywell connected to the facility sewer piping was also a source of releases. A floor drain inside the building released wastes to a second dry well not connected to the sewer lines.

Although MDNR revoked Northernaire's wastewater discharge permit and plugged the discharge pipe leading to the municipal sewer in 1978, wastes continued to seep into the ground via the plant's drywells until operations ceased in 1981.

Initial Response

In 1978, MDNR received complaints about their drinking water from homeowners near the Northernaire site. Samples collected by the district health department showed hexavalent chromium present in the tap water of two homes. Levels detected were 2800 ug/l and 3800 ug/l – significantly above the drinking water standard of 50 ug/l. The City of Cadillac extended city water service to these homes. During the course of further investigatory sampling that followed, hexavalent chromium was detected in groundwater at a concentration of 930 ug/l at a depth of 150 feet below ground level (bgl). The study done in 1985, twenty years prior to this five-year review, indicated that the contamination had affected groundwater 1400 feet north of the site.

In 1981, children playing around drums outside the site suffered chemical burns. When MDNR inspected the site in May 1981, they transferred all barrels into the facility building. Based on reports of possible gas vapors in the building, USEPA and MDNR inspected the site in March 1983. No vapor readings were detected, and no drums or tanks inside the facility appeared to be leaking.

During the site inspection, discolored soil was seen in the catch basin twenty feet north of the building. Two pipes leading into the catch basin were not well-sealed and the bottom of the catch basin was open to the ground. The function of the second pipe appeared to be to redirect waste water to municipal sewer lines once the catch basin was almost full. This second pipe drained northeast where it was connected to the sanitary sewer line.

A removal action was initiated by USEPA on July 5, 1983 (see Attachment 1, Figure 6). As stated above, wastes containerized and removed from the site were: 3,450 gallons of acids; 5,402 gallons of cyanide wastes; 160 drums of cyanide wastes; and 5,000 gallons of waste hypochlorite solution. After decontaminating the inside of the building, liquid and sludge wastes were removed from process tanks and shipped to RCRA disposal facilities. Tanks were also decontaminated. Next, the contaminated sewer line to the north of the building was excavated and removed.

Because Northernaire Plating was not able to fund an investigation, in 1984 and 1985 MDNR conducted the State-led, federally-funded remedial investigation/feasibility study (RI/FS). The investigation did not find any cyanide contamination; however, hexavalent chromium was detected in two groundwater wells near the facility. The two wells were both screened in the intermediate aquifer. VOCs were detected at similar concentrations in wells both upgradient and downgradient of Northernaire.

The second part of the investigation involved a broader look at the groundwater contamination in the Cadillac Industrial Park Area. The State-led, federally-funded study, "Cadillac Area Groundwater Contamination Remedial Investigation," was completed in August 1988.

Basis for Taking Action

Hazardous substances that have been released into groundwater and soil at the Northernaire site include hexavalent chromium, cadmium, and cyanide. In addition, the site may have contributed TCE and other chlorinated organics to the VOC contamination in groundwater. The amount of VOC contamination due to the Northernaire facility was not determined.

The primary exposure pathway of concern at the site is via ingestion of groundwater. Evaluation of the potential exposure and risk showed that a resident drinking groundwater from either the shallow or the intermediate aquifer would be exposed to excess lifetime cancer risks in the range of 10^{-5} to 10^{-3}. In addition: (1) the City of Cadillac municipal well field is 1300 feet north of the Northernaire site; (2) trichloroethene, although not a primary compound of concern at the Northernaire site, has been detected in city well #7 above the maximum contaminant level (MCL) of 5 ug/l on numerous occasions; and (3) a number of residents in the North Park subdivision, to the north of the Industrial Park in which the site is located, still use their private drinking wells as either drinking water or for other domestic uses.

IV. REMEDIAL ACTIONS

Remedy Selection

A ROD for OU1 was signed by USEPA in September 1985. The ROD called for the following actions:

- Excavation of soils and remaining sediments surrounding the sewer line to meet cleanup requirements of 50 mg/kg for chromium and 10 mg/kg for cadmium;
- Decontamination of the floor inside the building; and
- Removal of the portion of the concrete floor inside the building where the drywell is located and, based on soil sample results from the drywell, excavate and dispose of all soils that do not meet the cleanup criteria.

The ROD for OU2 for the Northernaire site was signed on September 29, 1989. It was intentionally written to address the groundwater contamination at two Superfund sites -- the Northernaire site and the Kysor Industrial site, another Superfund site located in the Cadillac Industrial Park Area. As described above, the predominant compound of concern at the Northernaire site is hexavalent chromium. Contaminants in groundwater arising from the Kysor site included a number of chlorinated organic compounds.

The OU2 ROD has two separate cover sheets, referred to as the "Declaration for the Record of Decision," but the remainder of the document serves as a single ROD for both the Northernaire and the Kysor Industrial sites. It was after this ROD was signed that the sites began to more often be referred to as the "Northernaire/Kysor" sites than by their individual names. The OU2 ROD served as the second and final action for the Northernaire site and as the first and final action for the Kysor Industrial site.

The components of the remedies required for each site were identical except that the remedy for the Kysor site also called for the installation of a soil vapor extraction (SVE) system. This five-year review focuses primarily on the status of the cleanup of hexavalent chromium in groundwater in the Cadillac Industrial Park. The five-year review for the Kysor Industrial site provides more information about the part of the cleanup concerning VOCs in groundwater.

For the Northernaire site, the OU2 ROD called for the following:

- Install a groundwater extraction and treatment system to remove groundwater contamination from the area surrounding the site;
- Conduct groundwater monitoring to assess the quality of area groundwater; and
- Impose access and use restrictions.

In the ROD for the Kysor site, a requirement in addition to those listed above was to install a vacuum extraction system to remove contamination from soils. Because an SVE system already had been built at the Kysor site, the implementation of the OU2 ROD involved expanding the existing system. The Statement of Work attached to the UAO issued to Kysor Industrial in January 1995 established one additional remedial component for the Kysor site. The additional requirement was to address soil contamination, via removal or otherwise, at the Ingraham property, where Kysor had disposed of industrial waste from the Wright Street plant.

For the Northernaire site, the cleanup level in the OU2 ROD of most relevance was that for hexavalent chromium. The OU2 ROD set the target cleanup level at 50 ug/l. Groundwater cleanup levels in the ROD for the VOC contamination in groundwater are shown below.

Compound	**Target Cleanup Level (ug/l)**
1,1,1-trichloroethane	200
trans-1,2-dichloroethene	70
1,1-dichloroethene	5
1,2-dichloroethane	5
methylene chloride	5
tetrachloroethene	1
trichloroethene	5
xylene	440
toluene	40

In 1994, USEPA signed an Explanation of Significant Difference (ESD) to document a slight change in the remedy. The purpose of the ESD was to document the decision by USEPA to include the contaminated groundwater from the Northernaire/Kysor site that had migrated into the North Park subdivision area, which is to the north of the Cadillac Industrial Park, as part of the site. The intent was not to change any of the required actions in the OU2 ROD, but was simply to document that the current remedy would be addressing the further extent of the plume. The cleanup established in the OU2 ROD, and to which the ESD applies, is the remediation of the releases from the facilities to which USEPA issued a UAO. Through a mechanism put in place by the City of Cadillac, other facilities in the Cadillac Industrial Park are also contributing to the costs of the cleanup.

Remedy Implementation

The OU1 remedial action took place in October and November 1988. Due to complications arising from disposal of concrete and debris inside the plant building, this final portion of the remedy was completed in early 1991.

A UAO for remedial design of OU2 was issued in May 1990. Nine parties, including Northernaire Plating Company, were named on the Order. The other parties were: Top Locker Enterprises, Inc., R.W. Meyer, Inc./Meyer Construction, Co., Willard S. Garyood, Kysor of Cadillac, Four Winns Company, Four Star Corp., Jomar Company, and Leo

Ingraham, Sr. The remedial design addressed the work required in the OU2 ROD for both the Northernaire site and the Kysor Industrial site and was finalized in March 1995.

Based on the findings of remedial investigative activities, the areas of contamination to be addressed by this remedial action were:

- A VOC plume in the shallow aquifer containing up to 115 mg/l of VOCs;
- A less concentrated VOC plume (up to 12 mg/l) in the intermediate aquifer;
- A hexavalent chromium plume at the base of the intermediate aquifer and in the shallow aquifer; and
- An area of soil contaminated with VOCs.

The systems and system components designed to remediate these areas are:

- A groundwater extraction system consisting of 18 wells, one of which delivers water to a granular activated carbon (GAC) unit for chromium cleanup and then to the air stripping system for VOC removal, while the other 17 wells deliver extracted groundwater directly to the air stripping towers for VOC removal
- Associated pipelines to convey contaminated groundwater from the extraction wells to the treatment systems
- A discharge pipe to convey treated groundwater to the Clam River
- A packed tower air stripping (PTAS) system to remove VOCs from groundwater
- A GAC system to remove hexavalent chromium from groundwater
- A building housing the treatment systems
- An expanded SVE treatment system, consisting of 23 extraction/induction wells grouped into four areas, to remediate soils contaminated with VOCs at the Kysor property

The extraction well that pumps groundwater contaminated with chromium is conveyed via a separate piping system to the treatment plant. The water entering the treatment plant from this well goes through not only the carbon adsorption treatment for chromium, but is then routed to the air stripping system. Water entering the plant from one of the other 17 extraction wells is sent directly to the air stripping towers. The 18 extraction wells are shown in Attachment 1, Figure 7, and the groundwater piping layout and outfall location into the Clam River are shown in Attachment 1, Figure 8.

The treatment system for chromium includes two GAC contactors, a pH control system, and associated valves and piping. The piping system is configured so that either a single contactor may be used or the two may be used in series. After concentrated sulfuric acid is added using an in-line mixer, the flow is sent to the carbon contactors for chromium treatment. Prior to discharge, the pH of the carbon-treated effluent is adjusted by adding a sodium hydroxide solution. Under normal conditions, the effluent from the carbon treatment is then conveyed directly to the influent line for the air stripping system, or PTAS.

Via gravity-driven piping, the effluent from the PTAS system discharges to the Clam River. Alternatively, the treatment facility design includes vertical turbine pumps, also referred to as cooling water make-up pumps, which may be used to pump up to 800 gpm to the Co-generation Power Plant located 4,000 feet west of the treatment facility. Revenue from sales of cooling water to the Co-generation Plant is used to help fund the costs of operating the treatment plant.

An initial list of discharge limitations were provided by MDNR in the OU2 ROD. During remedial design, however, the Respondents went through the formal application process with MDNR, Surface Water Quality Division, to obtain final limits. A Substantive Requirements Document (SRD) prepared by MDNR in 1994 and the new discharge permit issued in 1996 provided the discharge monitoring requirements (DMRs) for the treatment plant. The purpose of the SRD and the discharge permits was to establish requirements and limits for discharging treated groundwater via an outfall to the Clam River. For Superfund sites, the SRD can substitute for receiving permits such as an air emissions permit or a National Pollutant Discharge and Elimination System (NPDES) permit. The 1994 SDR and 1996 permit provide the following limits:

Compound	**Daily Maximum (ug/l)**
1,1,1-trichloroethane	5
1,2-dichloroethane	5
tetrachloroethene	5
trichloroethene	5

Compound	**Monthly Average (ug/l)**
Hexavalent chromium	8.3
Total chromium	59

Sampling is generally required on a weekly basis. Except for total chromium, the compounds listed above also have target cleanup levels specified in the OU2 ROD. Of these five, the ROD cleanup levels are the same as the limits above for two compounds, more stringent for one compound, and less stringent for the other two.

- TCE and 1,2-DCA ROD cleanup levels are the same (5 ug/l)
- PCE ROD cleanup level is more stringent (1 ug/l)
- 1,1,1-TCA ROD cleanup level is less stringent (200 ug/l)
- Hexavalent chromium ROD cleanup level is less stringent (50 ug/l)

On-site construction began in June 1995. The groundwater treatment and extraction system began operating in September 1996, and the first round of the quarterly monitoring program was completed in November 1996.

Institutional Controls

Another component of the remedies for the Northernaire and the Kysor sites was to "impose access and use restrictions." In the Statement of Work attached to the UAOs this requirement is further defined to be "implementation of institutional controls in the form of deed restrictions and/or enforceable ordinances." To meet this requirement, the City of Cadillac passed an ordinance imposing restrictions on the real estate described in ordinance. The restrictions include prohibiting installation of drinking water wells on the site and installation of any wells that might interfere with the operation and maintenance of the groundwater extraction or treatment systems, except with written consent by USEPA. The ordinance also prohibits tampering with or removal of the containment or monitoring systems at the site. A copy of the ordinance, along with a certification that it is still in effect, is in Attachment 3.

In the late 1970s, when hexavalent chromium was found in on-site groundwater, residences located in the Industrial Park were connected to the City of Cadillac municipal water system. The closest off-site residences are in the North Park subdivision across Thirteenth Street, which is the

northern border of the Industrial Park. (See Attachment 1, Figures 3 and 9.) When the ROD was issued in 1989, data indicated that contaminated groundwater had not migrated beyond Thirteenth Street. In more recent years, however, VOCs have been detected in monitoring wells near and in the subdivision. Although the City of Cadillac passed an ordinance restricting groundwater use and well installation in the Cadillac Industrial Park, because the North Park subdivision is in Haring Township, the ordinance does not cover these wells. In the past, residents who still had private wells were made aware of the potential threat and were advised to connect to the municipal water line. Some connected to municipal water, however, it is reported that some residents still maintain their own wells for non-drinking water purposes, such as watering gardens. It is not known whether any residents still use their private wells for drinking or whether there are other, non-residential establishments north of the site that still operate and use private wells.

One of the recommended follow-up actions included in this report (see Table 6) is to develop an Institutional Controls Study Plan. This plan will serve not only to review the issues, but to devise options for addressing them. The plan will also include developing timelines for the implementing the approved approach(es) and carrying out the necessary steps to put the institutional controls into effect. Regarding the city ordinance, examples of the types of information that the plan will need to document are: the methods used to monitor compliance with and enforce the ordinance; whether there have been any instances of non-compliance, and, if so, what action was taken; whether there is a plan in place for notifying USEPA if the ordinance is changed, and, if not, developing a plan will be required; whether any variances to the ordinance have been granted; and assessing, overall, whether the ordinance has been effective and is the best approach for achieving the intended objective of the ROD.

The Institutional Controls Study Plan will also address the lack of institutional controls regarding private wells in the North Park subdivision. If Haring Township is able to pass an ordinance to impose use restrictions in the area, some of the same questions as listed above for the city ordinance will need to be answered. Because an ordinance may only be able to restrict use that occurs in the future, solutions for the current situation will also need to be devised.

As stated above, attempts were made in recent years to encourage residents in the North Park area who have wells to connect to the municipal water system. This is one approach that should be re-evaluated in the Institutional Controls Study Plan. Based on the results of earlier efforts, however, a contingency plan would also need to be developed for cases where residents may choose to not abandon their private wells. An inventory of wells in the subdivision, to determine the exact number of existing wells, their approximate depths, if known, and how the water from the well is used, will be one of the first steps taken.

Operation and Maintenance (O&M)

Routine maintenance of the wells, extraction wells, SVE system, and groundwater treatment plant is done by the City of Cadillac. Some of the routine checks and maintenance tasks are checking items and replacing oil, belts, heat tape, worn valves and packing; cleaning roof-top heating unit; pulling and cleaning extraction wells if needed, and checking wells for freezing, damage, secured locks, and extraction well failure. Daily bench logs are kept up-to-date. Logs and data are electronically stored. One particular monitoring well, F-10S, has not been sampled lately due to the field crew not being able to locate it. It is suspected that the well may have been paved over by a property owner. One of the shallow VOC extraction wells, S-7, is not operational.

During the initial two years of operation, sampling frequency was quarterly. Annual monitoring began in October 1998, although several wells are still monitored on a quarterly basis.

The current sampling program to monitor the progress in cleaning up the hexavalent chromium in the shallow and intermediate aquifers includes:

- Annual sampling of 9 monitoring wells
- Annual sampling of the I-5 extraction well, which is the well designed to extract the chromium-contaminated groundwater
- Monthly sampling at the treatment plant of the influent, midpoint and effluent flows
- Weekly sampling of effluent for discharge monitoring requirements (DMRs)
- Annual static water level measurements at about 100 wells

Extraction well I-5, which pumps chromium-contaminated groundwater, is set in the intermediate aquifer and has a total depth of 182 feet bgl. The well screen in I-5 is 25 feet in length with the interval being 157 to 182 feet bgl. One of the nine monitoring wells for chromium is in the shallow aquifer, and the remaining eight, along with I-5, are in the intermediate aquifer. Attachment 4 provides a summary of the extraction well construction. All of these wells are sampled not only for dissolved total chromium and dissolved hexavalent chromium, but also for the nine VOCs identified as contaminants of concern in soil and groundwater for the Kysor site.

Collection of static water levels provides information on groundwater flow direction and capture zones of the groundwater extraction wells. A capture zone analysis completed in 2001 showed that the projected capture zone in five-years for the shallow and intermediate aquifers would encompass all of the monitoring wells except for one in each network. Because the analysis was so conservative, and because the concentrations in the two wells were only slightly above the ROD cleanup levels and seemed to be generally decreasing over time, the conclusion was that the extraction wells were adequately capturing groundwater as intended. However, a review and possible reanalysis of the capture zones are recommended due to several sampling results from 2002 that indicated that chromium-contaminated groundwater may be escaping the I-5 extraction well and being captured by a VOC extraction well, possibly I-2, I-3 or I-11.

In the OU2 ROD, it was estimated that the hexavalent chromium levels would be reduced to acceptable levels within four years. Cleanup time for the VOC contamination in the shallow aquifer was estimated at 29 years, and at 64 years for the intermediate aquifer. In the Preliminary Close-Out Report (1996) for the Kysor site, cleanup timeframes were indicated as: 5 years for hexavalent chromium; 5 to 30 years for VOCs in the shallow aquifer; up to 60 years for VOCs in the intermediate aquifer; and 2 years for the contaminated soil being treated with SVE.

Funding and Operation

Approximate annual costs of operation and maintenance (O&M) for both the Northernaire and Kysor sites are shown in the table below. Omitting the first partial year of operation and the estimated budget for 2006, the average amount spent per year is approximately $222,000. The estimate for annual O&M expenditures in the 1989 ROD was $125,000. In fiscal years 2004 and 2005, the costs of contractual expenses and utilities comprised from 50 to 65% of the total annual expenditures. On average since 2001, almost 900 staff-hours per year have gone into running and maintaining the remedial action. Capital and construction costs were significantly less than expected (about $1.3 million) and came in very close to the amount projected in the OU2 ROD. Groundwater treatment figures and a chart showing expenditures are in Attachment 4.

Table 2: Approximate Annual Operations/O&M Costs (fiscal year ending June 30)

Dates		Total Cost
From	To	
9/1996	6/1997	$110,000
7/1997	6/1998	$225,000
7/1998	6/1999	$190,000
7/1999	6/2000	$270,000
7/2000	6/2001	$160,000
7/2001	6/2002	$210,000
7/2002	6/2003	$240,000
7/2003	6/2004	$240,000
7/2004	6/2005	$235,000
7/2005	6/2006	$230,000
7/2006	6/2007	$275,000 (proposed)

Typically, Respondents to a UAO incur the full costs and responsibility for constructing the remedy and conducting O&M. For the Northernaire and Kysor sites, however, a public/private sector partnership was formed to address the cleanup. Although the City of Cadillac was not identified as a potentially responsible party (PRP) by USEPA and is not a Respondent to a UAO, it has taken the lead in constructing and operating the remedy. Using State legislation, the City of Cadillac formed a Local Development Financing Authority (LDFA) to facilitate construction of the remedy and assist with the capital expenditures of building the treatment system. The development project that was the catalyst for the formation of the LDFA was the construction of the Co-generation Power Plant. Revenue generated through tax increment funding (TIF) authorities, and funds from $7.4 million in bonds issued by the City, helped to finance the remedial construction. The bonds were paid off in March 2005.

To finance the annual costs of operating the plant, the City established a Special Assessment District the City established a Special Assessment District. Annual costs include running the plant, conducting monitoring, and any unexpected costs (see Attachment 5). All non-exempt property owners within the Special Assessment District, which to some extent approximates the area of the Cadillac Industrial Park, pay a yearly special assessment in addition to their property taxes. An example of an exempt party would be a resident. Within the LDFA, the non-exempt properties identified as contributing to the contamination are collectively responsible for 75% of the total operational costs; the other firms in the Industrial Park are responsible for paying the remaining 25%. The portion each facility pays is based on the acres of property owned.

In addition, revenues from the sale of treated groundwater to the Power Plant for its cooling processes also go towards annual operating expenditures. Further description of the LDFA Remediation Project is in Attachment 6.

V. PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

Table 3: Actions Taken Since the Last Five-Year Review

Recommendations From Previous Review	Party Responsible	Action Taken
Continue groundwater treatment	Respondents	On-going
Evaluate groundwater for contaminant trends	Respondents	Evaluation of trends included in annual monitoring reports; also, in response to a related legal case that MDEQ is handling, contractors for MDEQ have completed an additional investigation of the multiple groundwater plumes in the area and summarized their findings in a report, a technical memo and a PowerPoint presentation; additional trend analyses are currently being completed
Analysis of monitoring well network	Respondents	MDEQ had several additional wells installed to provide more information on a plume arising from a facility to the east of the Kysor Industrial property; no other changes made to monitoring network
Review extraction and treatment system for optimization opportunities	Respondents	Only one GAC unit is now used for the chromium treatment train; no pH adjustment is necessary; NaOH and HCl tanks emptied in 2001
Review request to change cleanup level for PCE from 1 ug/l to 5 ug/l	USEPA/MDEQ	Both current and proposed cleanup levels are already being met in many of the monitoring wells; may reevaluate to determine if any change is necessary

Since the last five-year review, over 5000 million gallons of groundwater have been extracted and treated, and almost 9,000 pounds of VOCs have been removed from groundwater. MDEQ has collected additional information on other groundwater plumes in the area and has obtained several expert analyses on the contamination in the Cadillac Industrial Park

VI. FIVE-YEAR REVIEW PROCESS

Administrative Components

MDEQ and the City of Cadillac were notified of the initiation of the five-year review in October 2004 and December 2004, respectively. The preparation of the five-year review for the Northernaire site was led by Mary Tierney, USEPA, with assistance and review provided by Scott Cornelius, MDEQ, and James Skipper, MDEQ. USEPA was the lead-Agency for the review.

The components of a five-year review include:

- Community Notification
- Document Review
- Data Review
- Site Inspections
- Report Development and Review

Community Involvement

A Public Notice was published on May 18 and 23, 2005, in the Cadillac News announcing that a five-year review of the Northernaire site was to be conducted. Community meetings and interviews with residents and City officials were held on April 26 and 27, 2005. Several residents said their impression of the problem was that it was being handled very well by the City. Residents were supportive of the approach the City was using, that is, how they had developed a creative way to address the soil and groundwater contamination at the Superfund sites, and how the City had formed partnerships with the industries in the Industrial Park to work together on remedial action.

The City has been very satisfied with the progress of the cleanup and has requested that MDEQ and USEPA evaluate the proposal for shutting down the chromium treatment system and for doing preliminary soil sampling as part of the first step to developing a closure plan, if sample results support it, for the SVE system on the Kysor Industrial property.

One citizen voiced serious concerns about the groundwater plume from the Rexair facility which is directly east of the Kysor Industrial site. She felt confident that the Northernaire/Kysor contamination was being cleaned up and that the treatment was running smoothly, but her perception was that the cleanup of the Rexair plume was not going as well, and she was concerned that the problem Rexair was creating might end up being worse than the Superfund problem. She was also concerned about air emissions from a nearby power plant.

Document Review

This five-year review consisted of a review of relevant documents including RODs, the ESD, investigatory reports and studies, correspondence, memoranda, O&M records, construction specifications, hydrogeologic studies, performance management plans, remedial action construction report, City of Cadillac summary description of LDFA and annual budgets, expert opinion reports, annual evaluation reports, and monitoring data (see Attachment 7). Applicable cleanup standards/goals, as listed in the 1985 and 1989 RODs, were also reviewed (see Attachment 8).

Data Review

Types of Monitoring and Compliance Status

Four types of groundwater samples for hexavalent chromium are collected as part of the Northernaire site monitoring program:

- Monitoring well samples
- Treatment plant samples–GAC chromium treatment
- Treatment plant samples–air stripping system
- Clam River discharge samples

In summary, applicable performance standards have been achieved in all four types of monitoring since May 2001 or earlier. The compliance status for each of the four sampling components is listed below.

- Monitoring Well Samples: System has been in compliance since May 2001
  As of the sampling round in March 2005, 11 of the 11 monitoring wells in the sampling program had achieved the cleanup level for hexavalent chromium since May 2001.

- Treatment Plant Samples–GAC Chromium Treatment: System has been in compliance since 1996
  Concentration of hexavalent chromium has been below the 50 ug/l cleanup level at the point the groundwater from the extraction well enters the treatment plant – that is, before it flows through the carbon treatment contactor – since the end of 1996 (see Attachment 9, Graph 1).

- Treatment Plant Samples–Air Stripping System: System has been in compliance since 1996
  Concentration of hexavalent chromium exiting the air stripping system has been 10 ug/l or below for the entire O&M period (since September 1996). (See Attachment 9, Graph 2). Concentration of total chromium has been below 10 ug/l since 2000. (See Attachment 9, Graph 3).

- Clam River Discharge Samples: System has been in compliance since 2001
  The limit for the concentration of hexavalent chromium in the effluent is a monthly average of 8.3 ug/l. Samples are collected weekly. This limit has not been exceeded, on a per sample basis, since August 2001. Since March 2003, effluent results have been non-detect for hexavalent chromium. The last violation of the hexavalent chromium discharge limit occurred in December 2000. During December 2000, when the exceedence occurred, the average monthly concentration was 9.33 ug/l; the highest concentration during the month was 10 ug/l.

Sampling Data and Capture of Chromium-Contaminated Groundwater

The primary problem with the chromium cleanup is that some data indicate that the extraction well for chromium, I-5, is not capturing the entire hexavalent chromium plume. In this case, because the extraction system for the VOC plume capture is so much more extensive, one or more of the VOC-extraction wells are pumping chromium-contaminated groundwater to the treatment plant. It is likely that extraction wells I-2, I-3 and possibly I-11 may be pumping groundwater from the chromium plume. The influent from the VOC-extraction wells goes directly to the air stripping towers and does not pass through the carbon adsorption units for chromium treatment.

There are two primary reasons for the concern. One is an exceedence of the limit for hexavalent chromium (50 ug/l) seen in a sample collected from a VOC-extraction well in 2001. The concentration in the sample was 86 ug/l. Of the three additional samples collected from three other VOC-extraction wells, the results for hexavalent chromium were below the cleanup level, with the highest concentration of the three being 20 ug/l.

The second reason to be concerned that the VOC-extraction system may be capturing part of the chromium plume is that although the groundwater entering the chromium treatment system has been at 4 ug/l or below (total chromium) since December 2000, since that time concentrations of chromium exiting the air stripping towers have at times been higher than 4 ug/l. In addition, concentrations of groundwater entering the plant have been non-detect for hexavalent chromium since September 1999, while concentrations exiting the plant only began to show non-detect results as of the beginning of 2003. In other words, on some occasions the concentrations of chromium exiting the plant have been higher than what is detected in groundwater entering the plant from the chromium extraction well. Concentrations exiting the plant have at all times been well below the groundwater cleanup level of 50 ug/l (see Attachment 8, Graphs 1, 2, and 3). Because the VOC-extraction system consists of ten extraction wells, however, the concentration of hexavalent chromium from any particular well is not known.

Evaluation of Chromium Levels in Monitoring Wells[2]

Groundwater monitoring for hexavalent chromium for the Northernaire site consists of 11 compliance wells – one shallow well and ten intermediate wells. The group of intermediate wells includes the chromium extraction well. O&M sampling began in 1996 for 9 of the wells, and sampling of the other two wells began in mid-1997. Until the end of 2002, samples from 10 of the 11 wells were sampled quarterly. Thereafter, wells have been sampled two to three times per year. The extraction well has been sampled annually since 1998. The last sampling round for which data is available is March 2005. The wells shown in Attachment 1, Figure 10, include the extraction and monitoring wells for both the Northernaire and Kysor Industrial sites. The wells for the chromium monitoring are designated with ovals. Extraction well I-5, is directly left of the scale on the figure and directly north of the Northernaire site. Figure 11 in Attachment 1 also shows water level measurement wells, City of Cadillac municipal wells, and some of the monitoring wells for nearby facilities that also have groundwater plumes.

For 10 of the 11 wells, there are about 30 or more rounds of data to evaluate the general condition of the groundwater in over the past 9 years. (The extraction well only has 11 rounds of data to reference.) Three of the 11 wells are "sentinel" wells, that is, they were installed beyond what was believed to be the extent of the chromium plume, and it was not anticipated that they would show any detects for chromium. Two of these sentinel wells are just beyond the estimated edge of the plume, and the other is adjacent to the western edge of the City well field.

As stated previously, the groundwater cleanup level specified in the OU2 ROD for hexavalent chromium, 50 ug/l, has been met in all 11 compliance monitoring wells since May 2001. This means that as of March 2005, cleanup goals have been met for almost four years. The time it took to achieve the cleanup level was 3 years and 10 months. The estimated time to cleanup stated in the OU2 ROD was 4 years. The concerns about the possibility of incomplete capture of the

[2] The concerns about the possibility of incomplete capture of the plume, as described in the previous section, "Sampling Data and Capture of Chromium-Contaminated Groundwater," should be kept in mind when evaluating groundwater data.

plume, however, as described in the section above, should be kept in mind when evaluating groundwater data.

Samples from all 11 compliance wells, including the extraction well, have in fact been non-detect for both total chromium and hexavalent chromium since at least December 2003 – over two years since the most recent sampling. Detection limits for total chromium and hexavalent chromium are 20 ug/l and 5 ug/l, respectively.

Groundwater in 7 of the 11 wells met the cleanup criterion ever since the first O&M sampling took place. The first O&M sampling event was in 1996 for 9 of the wells and 1997 for two of the wells.

Table 4: Progress towards Achievement of Target Cleanup Level for Hexavalent Chromium in Groundwater (most recent data included is from March 2005)

Well(s)	Cleanup Progress	Comments
7 of 11	Achieved since sampling began	Cleanup level met for over 8 yrs
11 of 11	Achieved since May 2001	Cleanup level met for 3 yrs, 10 mo
11 of 11	Non-detect for total and hexavalent chromium since December 2003	Non-detect results in all monitoring wells for nearly 2 yrs

The four wells which are not included in the group that have achieved target cleanup levels since sampling began are MW-7, MW-10, MW-13, and MW-18. These wells are discussed below.

Well MW-7 exceeded the 50 ug/l cleanup level during only one sampling round, in March 2000, and is the well with the most recent exceedence. Except for two results above the detection limit and the March 2000 result, the well has been non-detect for chromium in all other sampling rounds. MW-7 is located approximately 1700 feet north of the Northernaire site and 300 feet south of extraction well I-5.

The three remaining wells, which have historically had a number of exceedences, are MW-10, MW-13, and MW-18. Information about each of these wells follows.

MW-10

- About 500 feet east of I-5
- Significant exceedences (1300 ug/l and 990 ug/l) of cleanup level during first two rounds of sampling in 1996
- Below cleanup criteria since the end of 1996
- Less than detection limit for hexavalent chromium since October 1998

MW-13

- About 150 feet from I-5
- Highest detects of 430 ug/l and139 ug/l in April and August 1998, respectively

- Decreased to 20 ug/l by March 2000
- Except for three results at 10 ug/l or below since March 2000, the only two other detects were 28 ug/l and 40 ug/l, in May 2001 and June 2001, respectively

MW-18

- About 300 feet from I-5
- Concentration of hexavalent chromium went from a high of 450 ug/l in August 1996 and steadily decreased to 4 ug/l by April 1999
- Only one detect of 5 ug/l since April 1999

(See Attachment 1, Figure 12, for hexavalent chromium concentrations in several wells.)

Site Inspection

After a preliminary site inspection with MDEQ on January 13, 2005, the five-year review site inspection of the Northernaire and Kysor sites was conducted on April 26 and 27, 2005, by the USEPA Remedial Project Manager, MDEQ personnel, and City of Cadillac officials. The purpose of the inspection was to assess the progress of remedy implementation, ensure records and site documents were available and up-to-date, inspect treatment units and the SVE system to verify they were operational and did not appear to have significant problems or flaws, view general site conditions and areas of other groundwater releases and plumes in the Industrial Park, and meet with officials from the City. Overall, the intent was to collect information to be able to better assess the protectiveness of the remedy and try to foresee any future remedy implementation problems and needs.

Most issues related to the remedy for the Northernaire site either were already identified at the time of the site inspection or subsequent to it. Because of the cold temperature, the SVE system had not been running in the winter. This was noted during the first visit to the site. The treatment plant housing the chromium and VOC treatment units was very well-maintained and no significant problems were noted. (See Attachment 10 for Site Inspection Checklist.)

VII. TECHNICAL ASSESSMENT

Question A: Is the remedy functioning as intended by the decision documents?

No. The two main issues that need to be addressed are the lack of use restrictions on private wells in the subdivision to the north of the site and the possibility that a portion of the chromium plume is being extracted by one or more of the VOC extraction wells and by-passing the chromium treatment system. Also, the effectiveness of the city ordinance currently serving as institutional control in the area of the site will also be evaluated. Other than those issues, and based on a review of relevant documents, data from monitoring wells and the treatment plant, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the results of the site inspection, USEPA believes that the remedy is functioning as intended in the OU2 ROD, as modified by the ESD.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Yes. The assumptions and information on which the OU2 ROD was based are still valid. The City well field should continue to be monitored to ensure that actual exposure to contaminated

drinking water does not occur. There have been no changes in the physical conditions at the site that would affect the protectiveness of the remedy.

Changes in Standards and To-Be-Considered Requirements
A list of ARARs is included in Attachment 8. One standard for allowable contaminant levels in groundwater has become less stringent. There have been no other changes in the ARARs and no new standards or to be considered (TBC) requirements affecting the protectiveness of the remedy.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics
The exposure assumptions used to develop the Human Health Risk Assessment included exposure to chromium-contaminated groundwater via ingestion. There has been no change in this exposure pathway. There have also been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. No changes to these assumptions appear to be needed. Furthermore, there has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Yes. In 2001, a sample from one well located outside of the capture zone of the groundwater extraction system for chromium showed an exceedence of the cleanup criterion. This indicates that in 2001 the extraction system was not entirely capturing the chromium plume. In the long-term, the capture zone of the chromium extraction well needs to be verified. However, no other events have affected the protectiveness of the remedy.

Technical Assessment Summary

Based on a review of relevant documents, data, ARARs, risk assumptions, and the results of the site inspection, the remedy for the Northernaire site is considered protective in the short term because there is no evidence that there is a current exposure. Long term protectiveness of the groundwater will be achieved after it is verified that the achievement of cleanup levels since 2001 is representative of conditions throughout the entire plume, that is, that the plume is being adequately captured. Regarding the potential for residential wells in the North Park subdivision to become contaminated, the preferred solution will be to have all residents install connections to municipal water lines and have all existing wells properly abandoned. In the interim, and to restrict future use of groundwater in the area, institutional controls will be implemented in the subdivision and other measures explored that would minimize the potential for exposure to chromium-contaminated groundwater. The existing institutional controls will also be reviewed.

VIII. ISSUES

Table 5: Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Hexavalent chromium plume not fully captured by the extraction system	N	Y

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Institutional controls do not extend into the North Park subdivision in Haring Township where private wells still exist, and the adequacy of the protections provided by the existing city ordinance has not been confirmed.	N	Y

IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 6: Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Hexavalent chromium plume may not be fully captured by the chromium extraction well, but may be partially captured by one or more VOC-extraction wells	Add chromium to the list of analytes for monitoring wells and extraction wells where the plume may have migrated beyond the capture zone. This may include wells beyond the current definition of the plume to the north, east, and west, and in the deep aquifer.	Respondent	USEPA MDEQ	3/2006	N	Y
	Re-evaluate capture zone analysis if determined it would be useful.			9/2006		
	Test influent to air stripping towers for chromium.			12/2005		

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Institutional controls do not extend into North Park subdivision in Haring Township, where private wells still exist, and not enough information is available to determine the adequacy of the existing city ordinance.	Develop an Institutional Controls Study Plan to evaluate the city ordinance currently in place and to devise and implement a plan to prevent exposure of residents in the North Park subdivision to contaminated groundwater from the Northernaire/Kysor sites. Examples of the types of questions the plan will answer, the issues it will address, and the actions that may be taken are described in this report in Section IV, Remedial Actions, under "Institutional Controls."	Respondent	USEPA MDEQ	6/2006 (Completion of Study Plan) 11/2005 (Inventory of private wells in North Park subdivision)	N	Y

Protective of Short-term

X. PROTECTIVENESS STATEMENT

The remedy implemented for the Northernaire site continues to be protective of human health and the environment in the short term since no evidence of an exposure exists. For long-term protectiveness to be ensured, institutional controls must be implemented that will restrict the use of groundwater in the subdivision north of the site, and the adequacy of existing institutional controls will be reviewed. Also, it must be confirmed that the achievement of cleanup goals in the current monitoring well network is representative of the entire plume of chromium-contaminated groundwater and that the plume is being adequately captured.

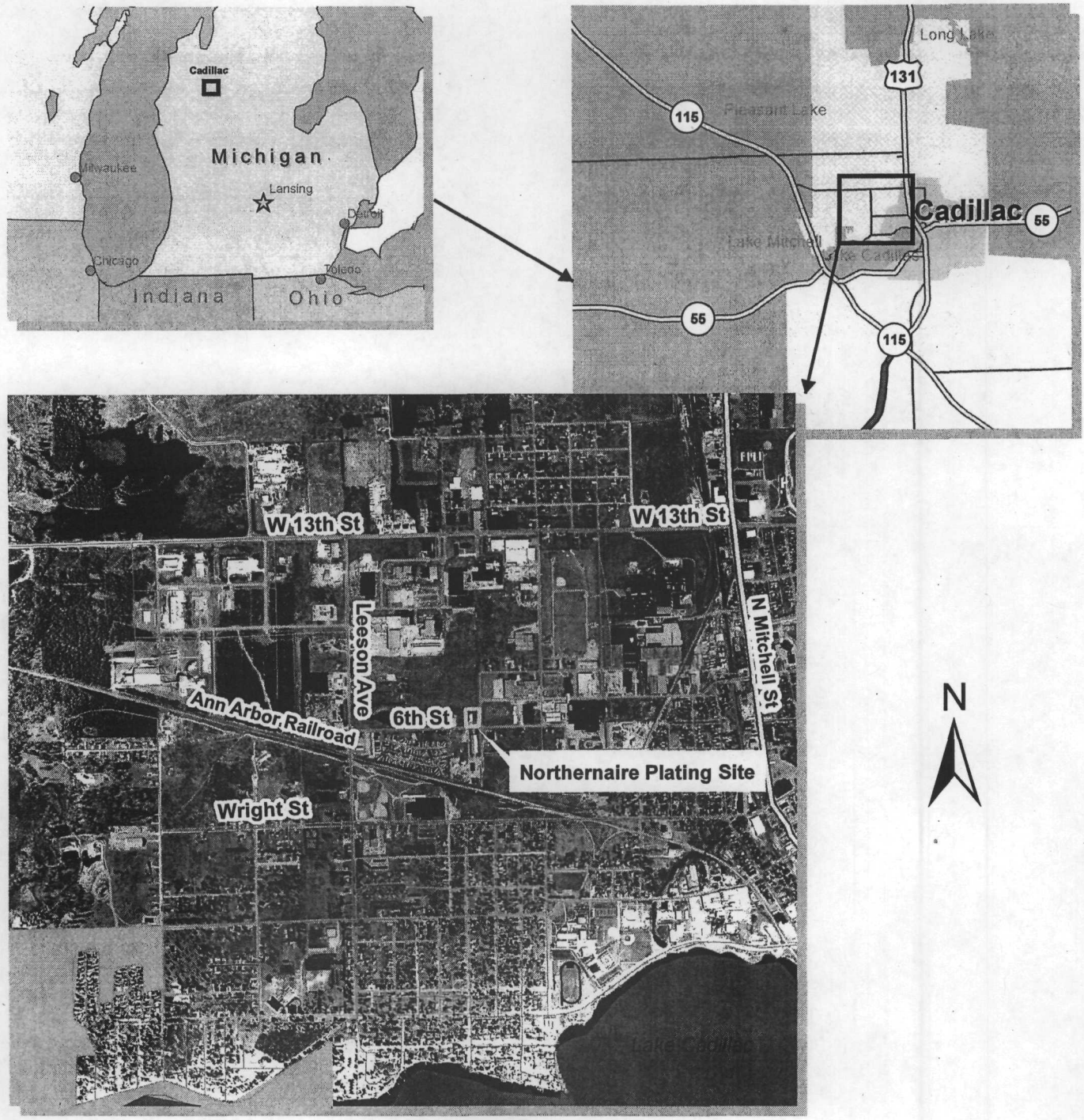
XI. NEXT REVIEW

The next five-year review will be completed by July 2010, which is approximately five years from the date of this review.

ATTACHMENTS

ATTACHMENT 1
FIGURES

Northernaire Plating Site
Cadillac, Wexford County, Michigan



Plot created by Andrea Porter U.S. EPA Regon 5 on 9/26/2005

GEOS
Groundwater Evaluation and Optimization System

Figure 1

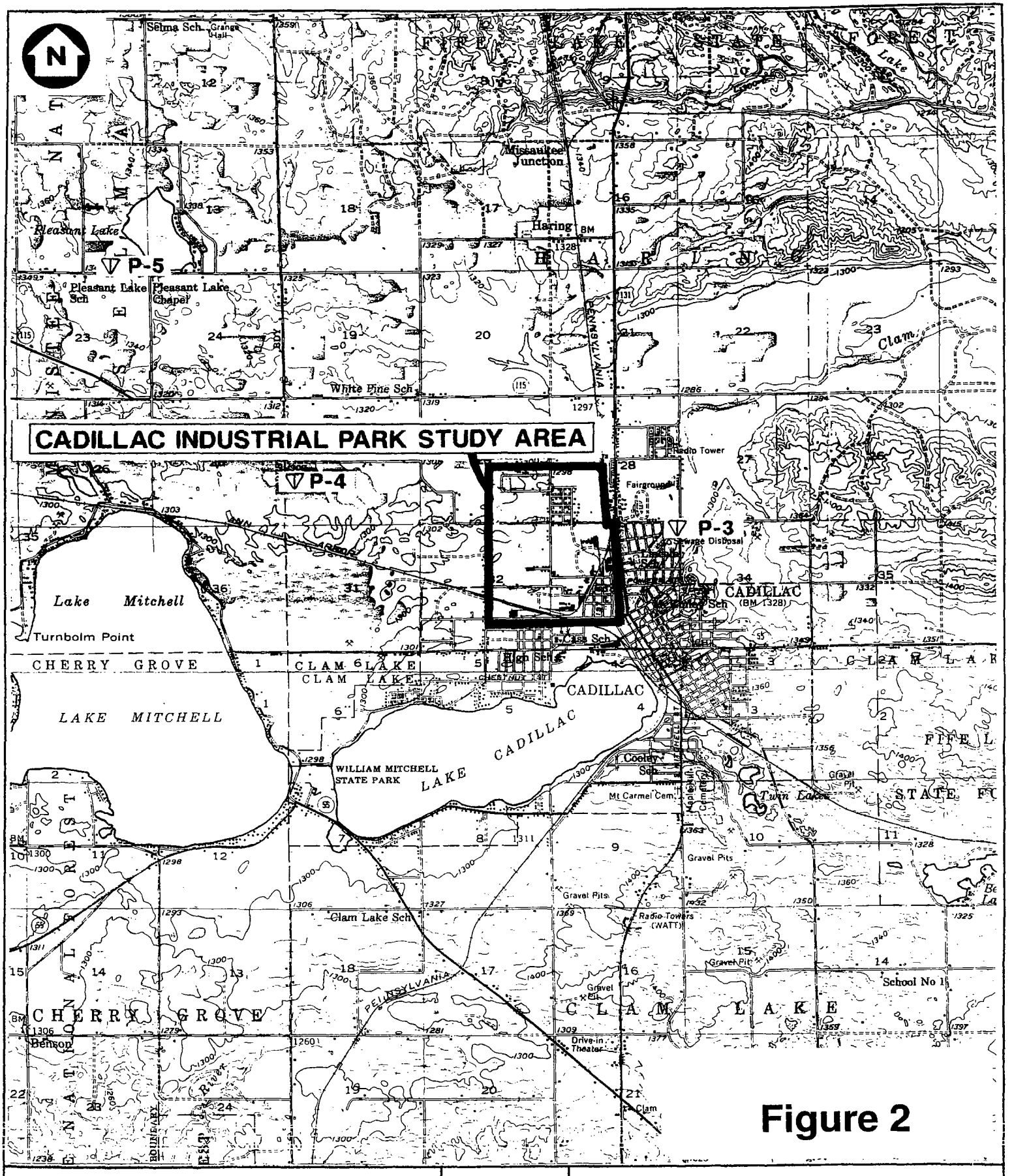


Figure 2

P-4 PIEZOMETER LOCATION

0 6000 12000 FEET

MICHIGAN

QUADRANGLE LOCATION

FIGURE 1-1
SITE LOCATION MAP
CADILLAC AREA RI
CADILLAC, MICHIGAN

E.C. JORDAN CO.

4656-52

Cadillac Industrial Park Groundwater Plumes

Weston Solutions, Inc., 2003

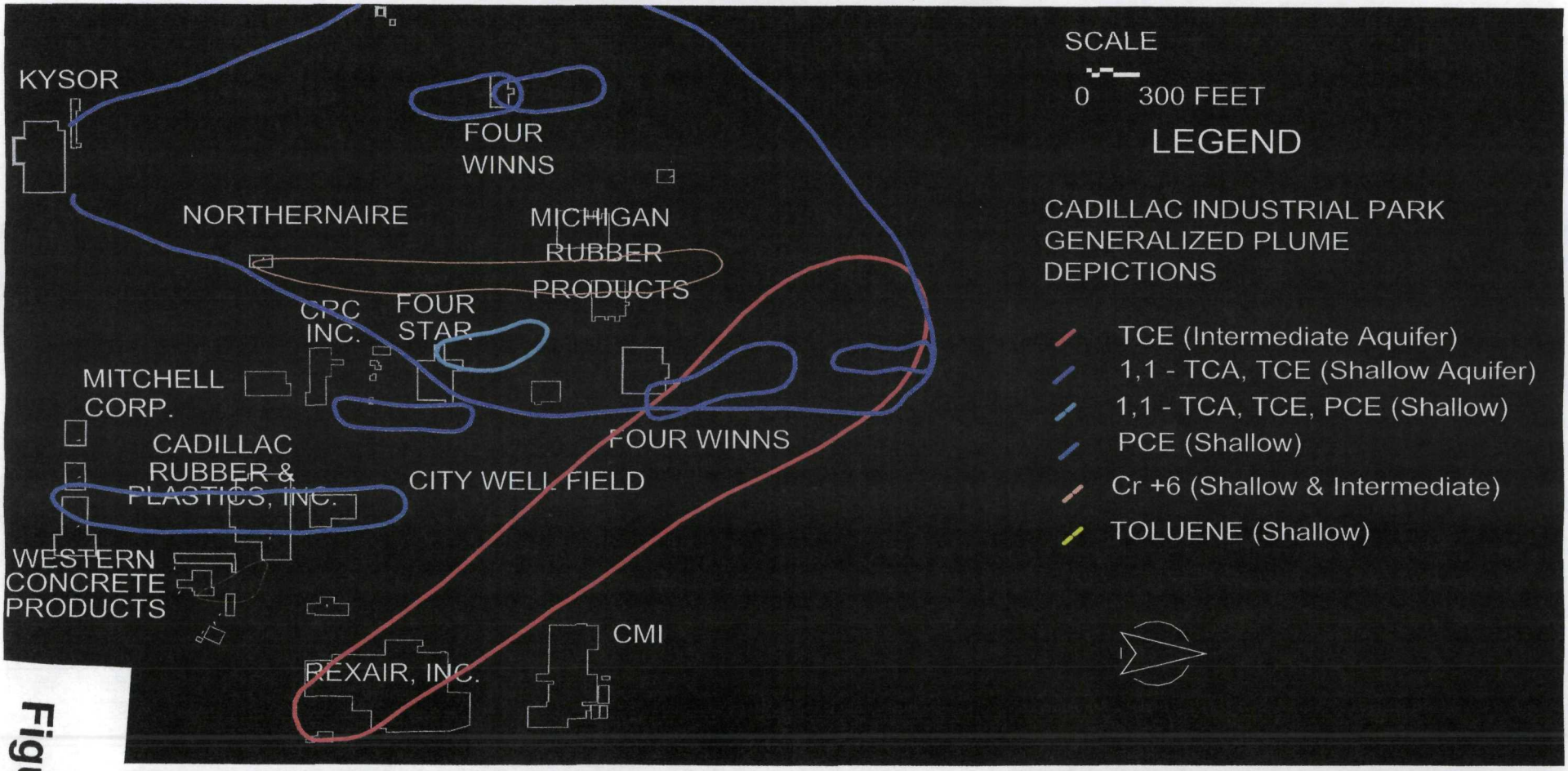


Figure 4

Location of City of Cadillac Well Field

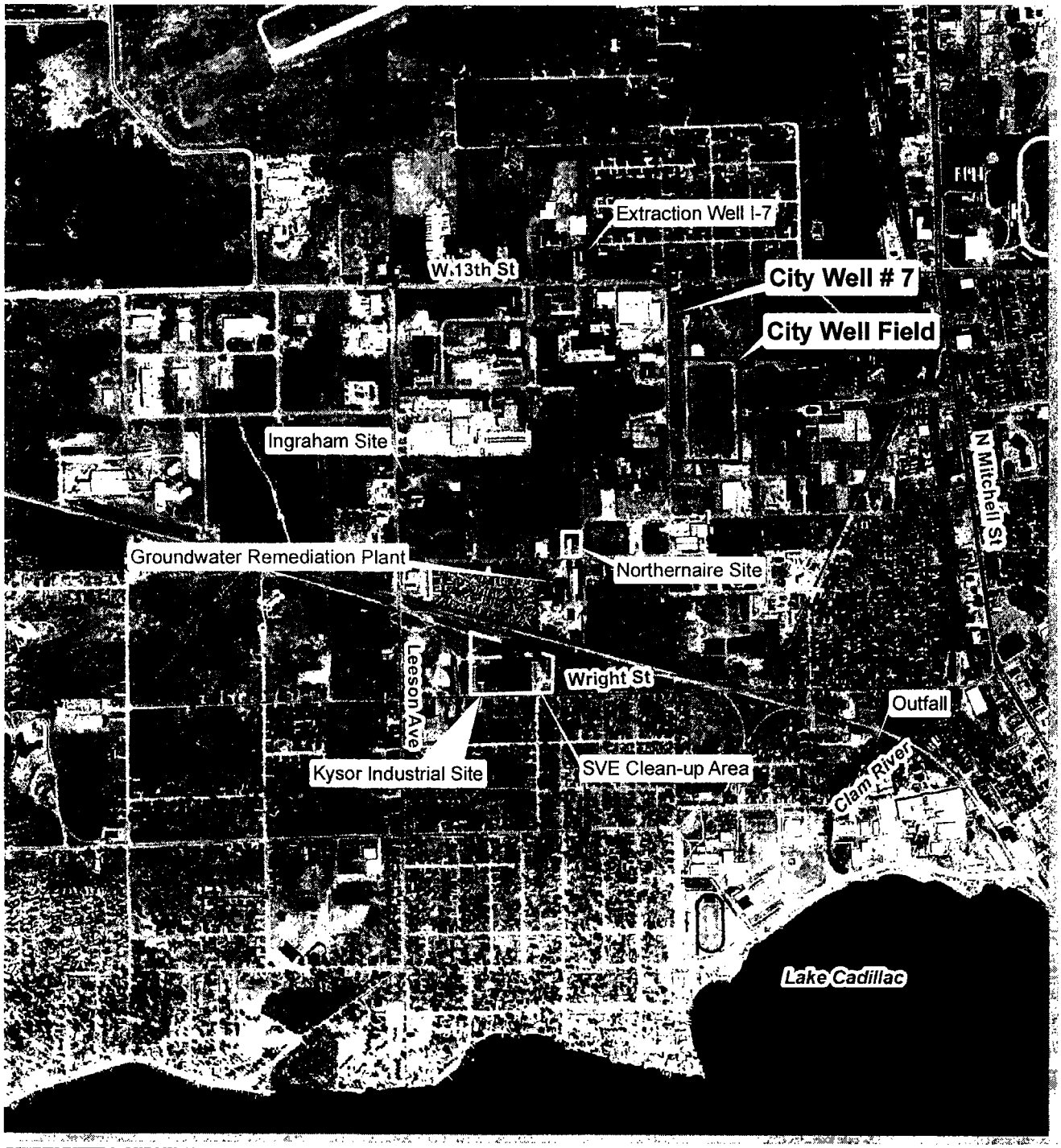


Figure 5

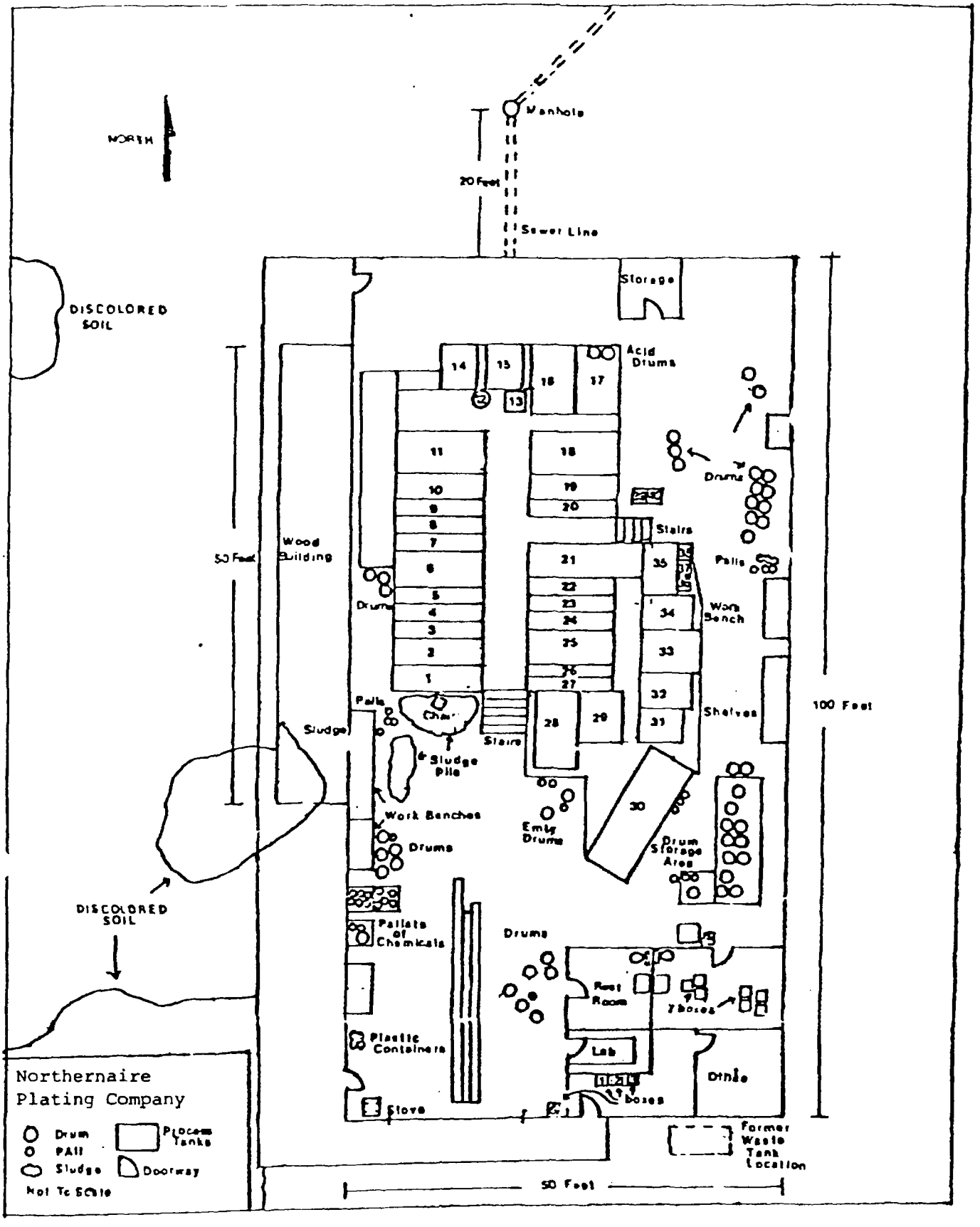


Figure 2. Northernaire Plating Co. building detail. Numbers correspond to site inventory contained in Appendix Q.

Figure 6

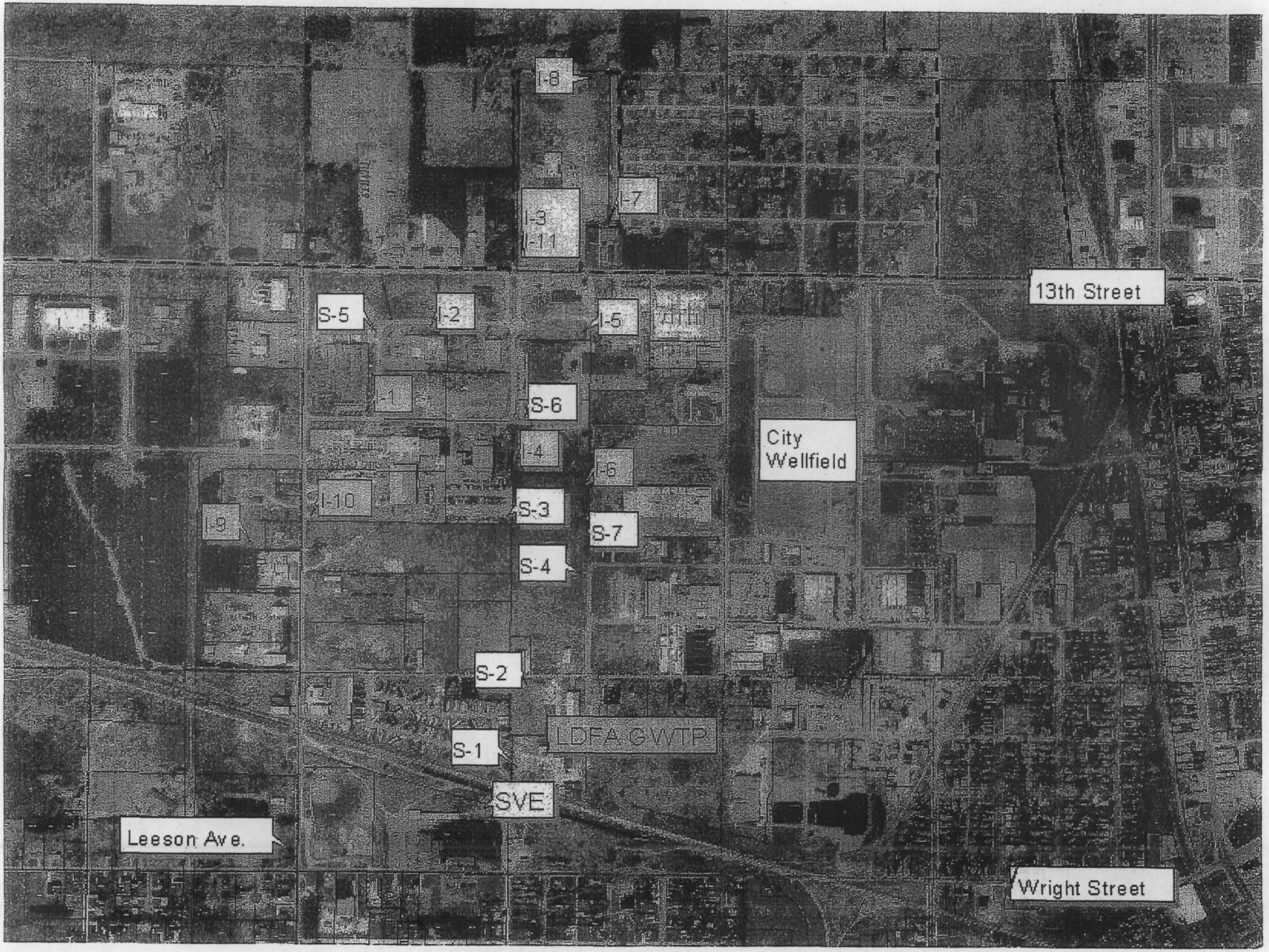
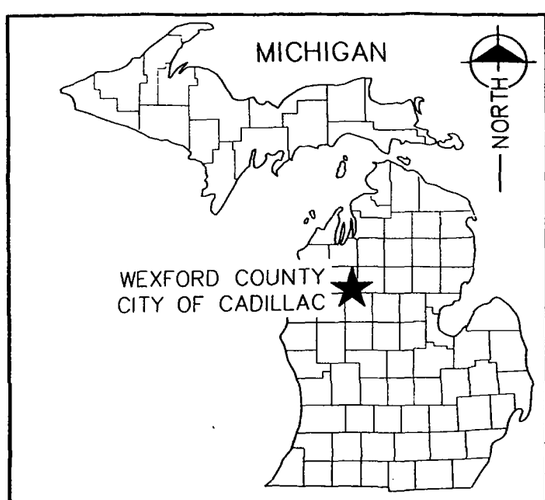

I-8
I-7
I-3
I-11
13th Street
S-5
I-2
I-5
I-1
S-6
City
Wellfield
I-4
I-6
I-10
S-3
I-9
S-7
S-4
S-2
LDFA GWTP
S-1
SVE
Leeson Ave.
Wright Street

Figure 7



VICINITY MAP

NORTH

0 500
SCALE IN FEET

PINE ST.
W. 16TH ST.
W. 15TH ST.
W. 14TH ST.
7TH AVE.
13 TH ST.
SAUNDERS ST.
CORWIN ST.
HOLMAN ST.
FRISBIE ST.
FRANK MILTNER ST.
6 TH AVE.
8 TH ST.
7 TH ST.
6TH ST.
5 TH ST.
8 TH AVE.
LEESON AVE.
WRIGHT ST.
US-131
TUSCOLA AND SAGINAW BAY RAILROAD
JRD AVE.
2ND AVE.
1ST AVE.
FARRAR AVE.
SENECA PL.
HUSTON ST.
WALOO ST.
COLFAX ST.
BOOM ST.
SELMA ST.
UNDEN ST.
RIVER
CLAM

WELL I-8
WELL I-7
WELL I-3
WELL I-11
WELL I-5
WELL S-5
WELL I-2
WELL I-1
WELL S-6
WELL I-4
WELL I-6
WELL S-7
WELL I-9
WELL I-10
WELL S-3
WELL S-4
WELL S-2
WELL S-1

BEAVER CADILLAC GENERATING FACILITY

EXISTING WELL HOUSE

MICHIGAN NORTHERN RAILROAD

GROUNDWATER EXTRACTION AND DISCHARGE PIPING (N.I.C.)

GROUNDWATER EXTRACTION AND DISCHARGE PIPING

COGENERATION MAKE-UP WATER FORCEMAIN

SOIL VACUUM EXTRACTION SITE (N.I.C.)

KYSOR INDUSTRIAL CORPORATION WRIGHT ST. PLANT

GROUNDWATER REMEDIATION FACILITY (N.I.C.)

OUTFALL PIPE

Figure 8

EXTRACTION AND DISCHARGE PIPING PLAN

NO.	REVISIONS	DATE	Drawn By	Managed By	Designed By	Date 1997

fishbeck, thompson, carr & huber
engineers • scientists • architects
Ada • Lansing • Kalamazoo
Michigan
Since 1958

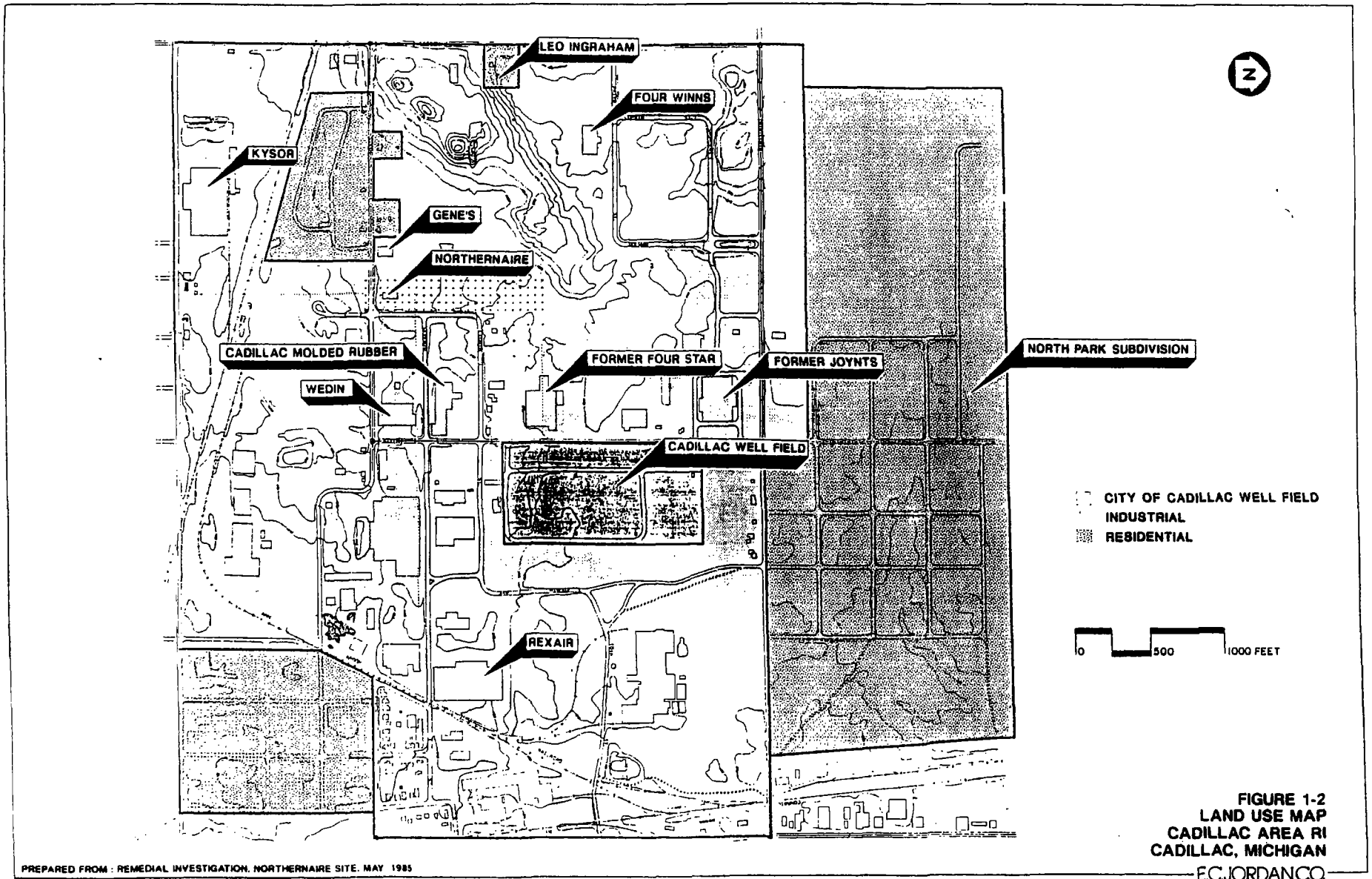
CADILLAC LDFA
CADILLAC, MICHIGAN

ANNUAL REPORT 1997

PROJECT NO. 951370

SHEET NO. 5

PLOT INFO: 951370\CGI\951370209 DATE: 01/24/98 TIME: 10:47 am USER: SG



PREPARED FROM : REMEDIAL INVESTIGATION, NORTHERNAIRE SITE, MAY 1985

4858-52

FIGURE 1-2
LAND USE MAP
CADILLAC AREA RI
CADILLAC, MICHIGAN

E.C.JORDAN CO.

Figure 9

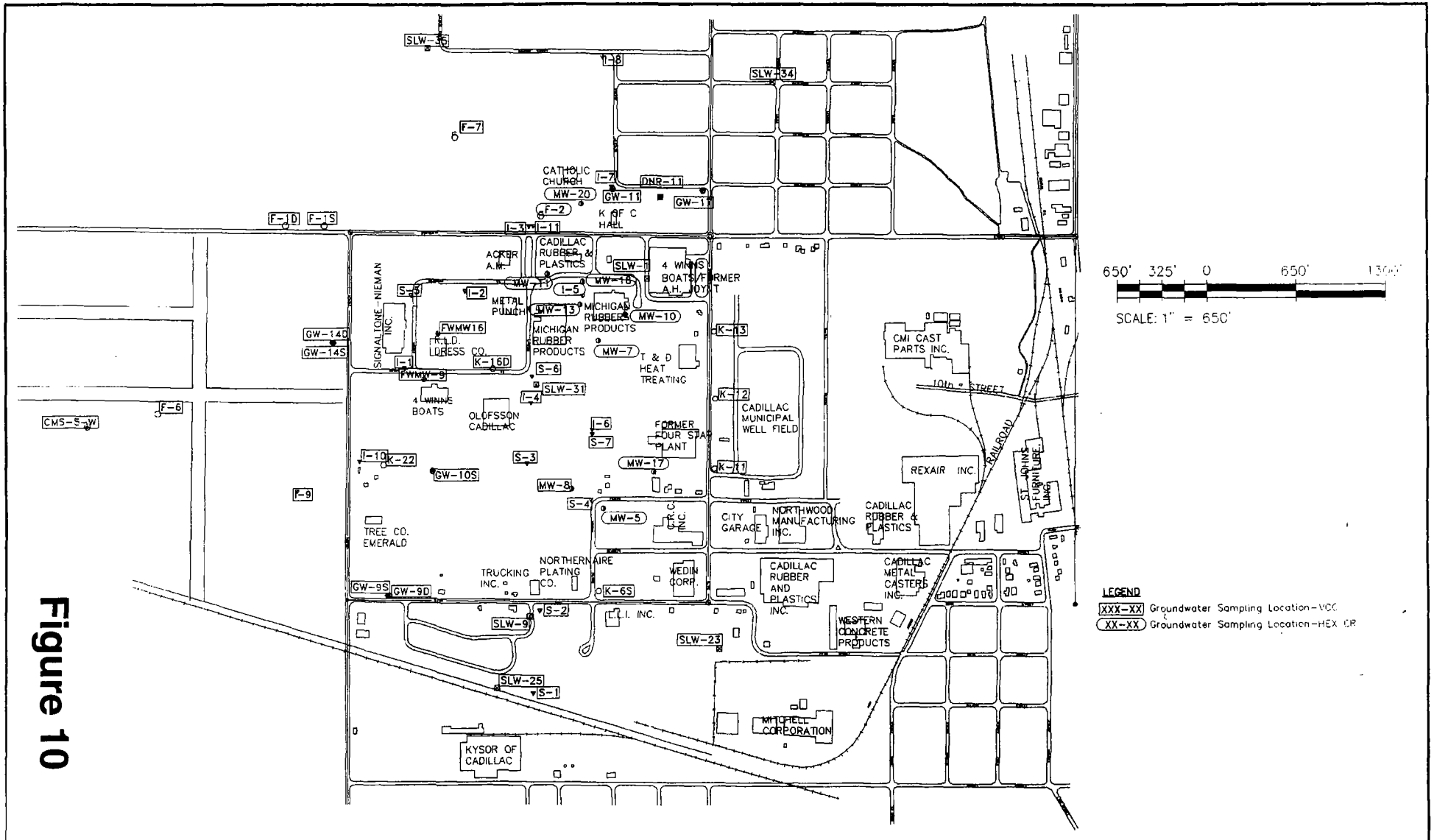


Figure 10

TETRA TECH MPS

CHECKED: P. DAUKSS | DATE: 8/25/05

NORTHERNAIRE/KYSOR SITES
GROUNDWATER
SAMPLING LOCATIONS

FIGURE 1

O:\1560C41\01\GROUND WATER SAMPLING\2-[illegible]\FIG1.DWG

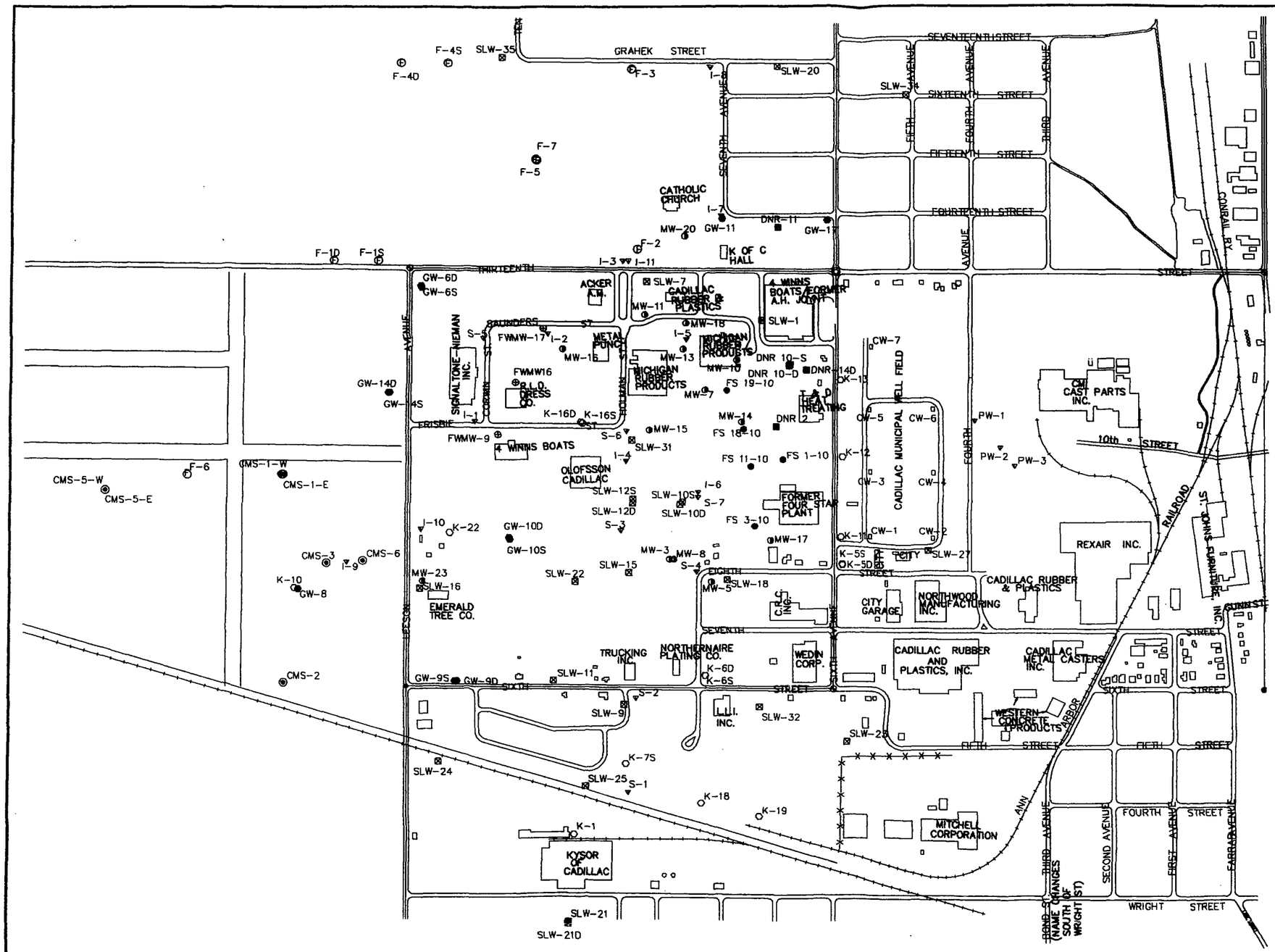


Figure 11

GeoTrans, Inc. A TETRA TECH COMPANY		2004 ANNUAL PERFORMANCE MONITORING REPORT NORTHERNAIRE/KYSOR SITES	FIGURE
CHECKED:	DATE:	GROUNDWATER SAMPLING LOCATIONS	1

P:\PROJECTS\CADILLAC\CADD\LDFASITEPLAN.dwg 04/28/05 DRB 1

HEXAVALENT CHROMIUM MONITORING
CONCENTRATION TREND
2004 ANNUAL PERFORMANCE MONITORING REPORT
NORTHERNAIRE/KYSOR SITES

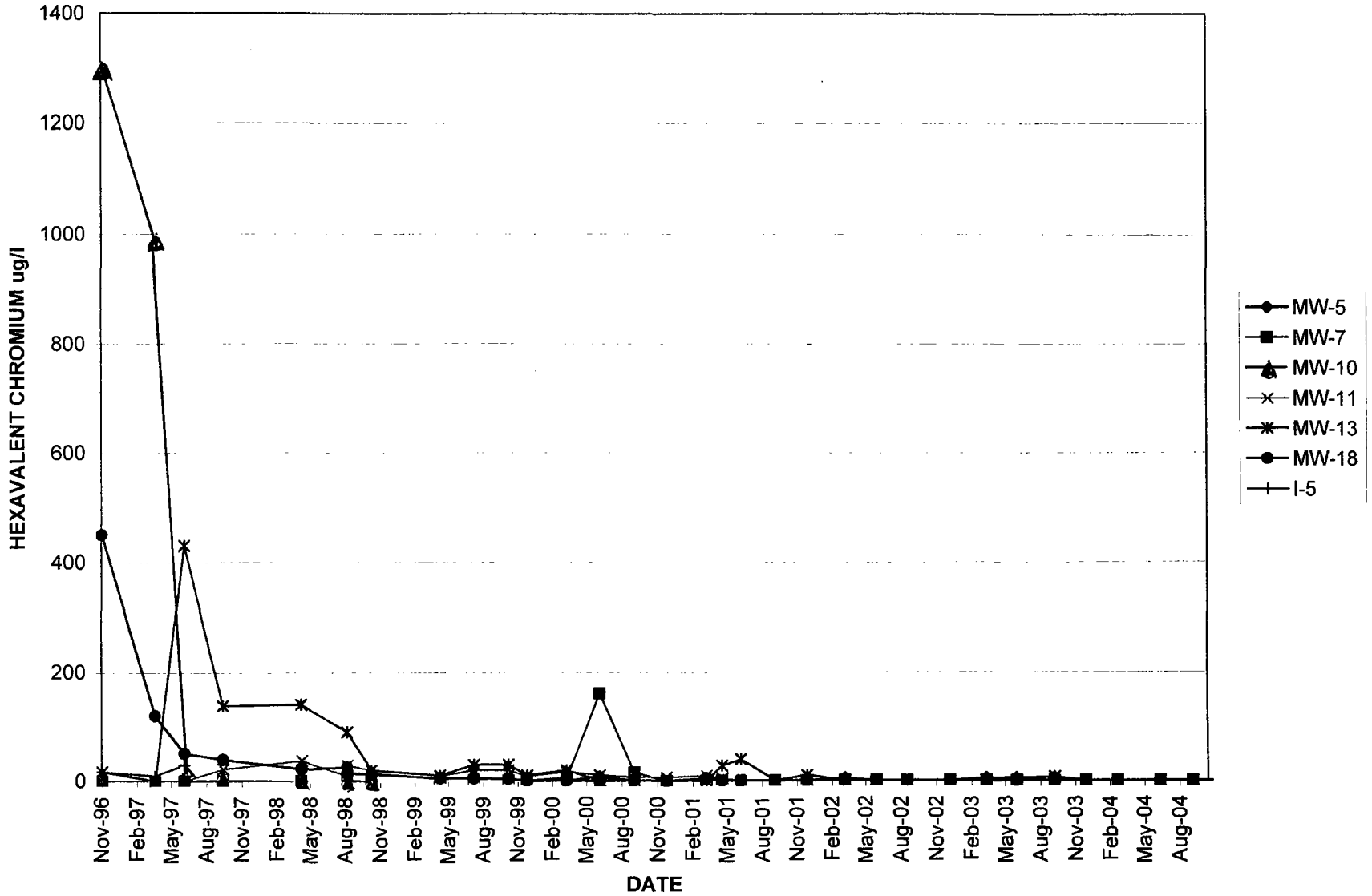


Figure 12

\\Mpsaa\projfiles-geo\Projects\Cadillac\2004 Annual Report\Chromecharts\all

DRB 4/27/05

ATTACHMENT 2
EXPANDED CHRONOLOGY OF SITE EVENTS

ATTACHMENT 3
CITY ORDINANCE

CITY OF
CADILLAC
MICHIGAN
200 North Lake Street • Cadillac, Michigan 49601
231.775.0181• fax 231.775.8755
www.cadillac-mi.net

Certification of Institutional Controls

The City of Cadillac hereby certifies that Ordinance #97-10, Chapter 24, Section 2.300, p. 2-83, establishing institutional controls for the remedial action at the Kysor/Northernire site within the City of Cadillac is still in effect. Said Ordinance was adopted November 3, 1997, and is part of the Codified Ordinances of Cadillac, Michigan.

Certified By:

Larry H. Campbell, Director
Cadillac Utilities Department

Date: May 16, 2005

Jan Nelson, City Clerk

Date: May 16, 2005

AN ORDINANCE TO AMEND THE CITY CODE OF THE CITY OF CADILLAC TO ADD A NEW SECTION 2.300 TO CHAPTER 24, TO ESTABLISH INSTITUTIONAL CONTROLS FOR REMEDIAL ACTION AT THE KYSOR INDUSTRIAL CORPORATION/NORTHERNAIRE PLATING COMPANY SITE LOCATED IN THE CITY OF CADILLAC.

THE CITY OF CADILLAC ORDAINS:

Section 1.
For the purpose of protecting public health, welfare and the environment, and for the purpose of implementing the remedial action plan at the site commonly known as the Kysor Industrial Corporation/Northernaire Plating Company Superfund Site, Section 2.300 is hereby added to read as follows:

Chapter 24, Section 2.300.
A. Use of the following described real estate shall be restricted by the provisions of this Subsection(a):

All land located in Township 22 North, Range 9 West, City of Cadillac, Wexford County, Michigan, described as follows:

1. The East Quarter (E 1/4) of the Northwest Quarter (NW 1/4) of Section 32.

2. The Northeast Quarter (NE 1/4) of Section 32.

3. The North Half (N 1/2) of the Southeast Quarter (SE 1/4) of Section 32.

4. The Southwest Quarter (SW 1/4) of Section 33 lying North and West of the Tuscola-Saginaw Bay Railroad.

5. The Northwest Quarter (NW 1/4) of Section 33, EXCEPT the following: South of Gunn Street and Seventh Street which is East of the Ann Arbor Railroad; the property lying East of the Pennsylvania Central Railroad; and also commencing as the Point of Beginning at the Southwest corner of Block 179 of the Improvement Board Addition; thence North to the Northwest corner of Block 188; thence East along the North line of Block 188 to the Northwest corner of Block 189; thence East along the North block line, 220 feet; thence South 71 feet; thence East 107.43 feet; thence North 71 feet; thence East 212.83 feet; thence South 16°2'30" East, 331.74 feet; thence South 3°28'30" East, 246.56 feet to the West right-of-way line of the Ann Arbor Railroad; thence Southwesterly along the West right-of-way line of the Ann Arbor Railroad to the Southeast corner of Block 177; thence West along the South line of Block 177 to the centerline of Third Avenue; thence North on the centerline of Third Avenue to the

Section 2.300 added, Ord. No. 97-10, adopted 11/3/1997.

South line of Block 179 and Block 178, if extended; thence West to the Point of Beginning of the Improvement Board Addition, City of Cadillac, Wexford County, Michigan.

(Hereafter referred to as the Kysor Industrial Corporation/Northernaire Plating Company Site [the "site"]).

1. No water wells used for drinking water or any other domestic use shall be installed in the Kysor Industrial Corporation/Northernaire Plating Company site (the "site"). There shall be no installation or operation of any wells that may interfere with the operation or maintenance of the groundwater extraction or treatment systems set forth in paragraph 2 following, except with written consent by the United States Environmental Protection Agency.

2. There shall be no tampering with, or removal of the containment or monitoring systems that remain on the site as the result of implementation of any response action by the United States Environmental Protection Agency, or any party acting under order by the United States Environmental Protection Agency, and which is selected and/or undertaken, or ordered by, the United States Environmental Protection Agency pursuant to Section 104 and/or 106 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

Section 2. This Ordinance shall take effect twenty (20) days after its passage.

Section 2.300 added, Ord. No. 97-10, adopted 11/3/1997.

ATTACHMENT 4
EXTRACTION WELL CONSTRUCTION SUMMARY

LDFA
Extraction Well Construction Summary

Extraction Well No.	Date Completed	Well Depth (feet bgl)	Screened Interval (feet bgl)
S-1	7/7/95	92	77 - 92
S-2	7/8/95	71.5	56.5 - 71.5
S-3	8/20/95	67	52 -67
S-4	7/10/95	50	35 - 50
S-5	7/9/95	67	57 - 67
S-6	7/24/95	53	43 - 53
S-7	8/5/95	46	36 - 46
I-1	7/10/95	187	162 - 187
I-2	7/19/95	185	160 - 185
I-3	9/29/95	221	201 - 221
I-4	8/20/95	177	152 - 177
I-5	9/8/95	150	125 - 150
I-6	8/2/95	179	154-179
I-7	10/5/95	164	139 - 164
I-8	8/30/95	158	133 - 158
I-9	7/25/95	190	165 - 190
I-10	8/15/95	191	166 -191
I-11	10/12/95	163	133 - 163

ATTACHMENT 5
O&M COSTS AND GROUNDWATER TREATMENT STATISTICS

L.D.F.A. Groundwater Treatment Statistics:

Volume of groundwater pumped and treated:

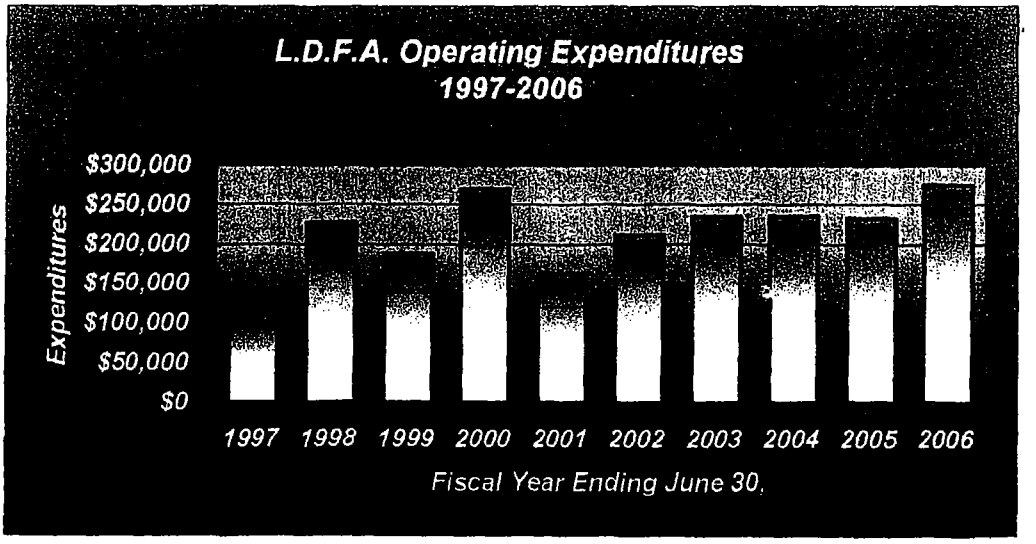
	Gallons per Year	Gallons per Day
1996	324,520,000	2,660,000
1997	967,100,000	2,650,000
1998	924,000,000	2,530,000
1999	889,330,000	2,436,500
2000	880,000,000	2,410,000
2001	870,180,000	2,384,000
2002	845,000,000	2,315,100
2003	851,000,000	2,331,500
2004	878,600,000	2,407,100

Estimated pounds of volatile organics stripped from the water:

1996	1,635 pounds at start up 9/1/96	2001	2,402 pounds per year
1997	4,840 pounds per year	2002	2,322 pounds per year
1998	3,466 pounds per year	2003	2,090 pounds per year
1999	2,761 pounds per year	2004	1,715 pounds per year
2000	2,628 pounds per year		

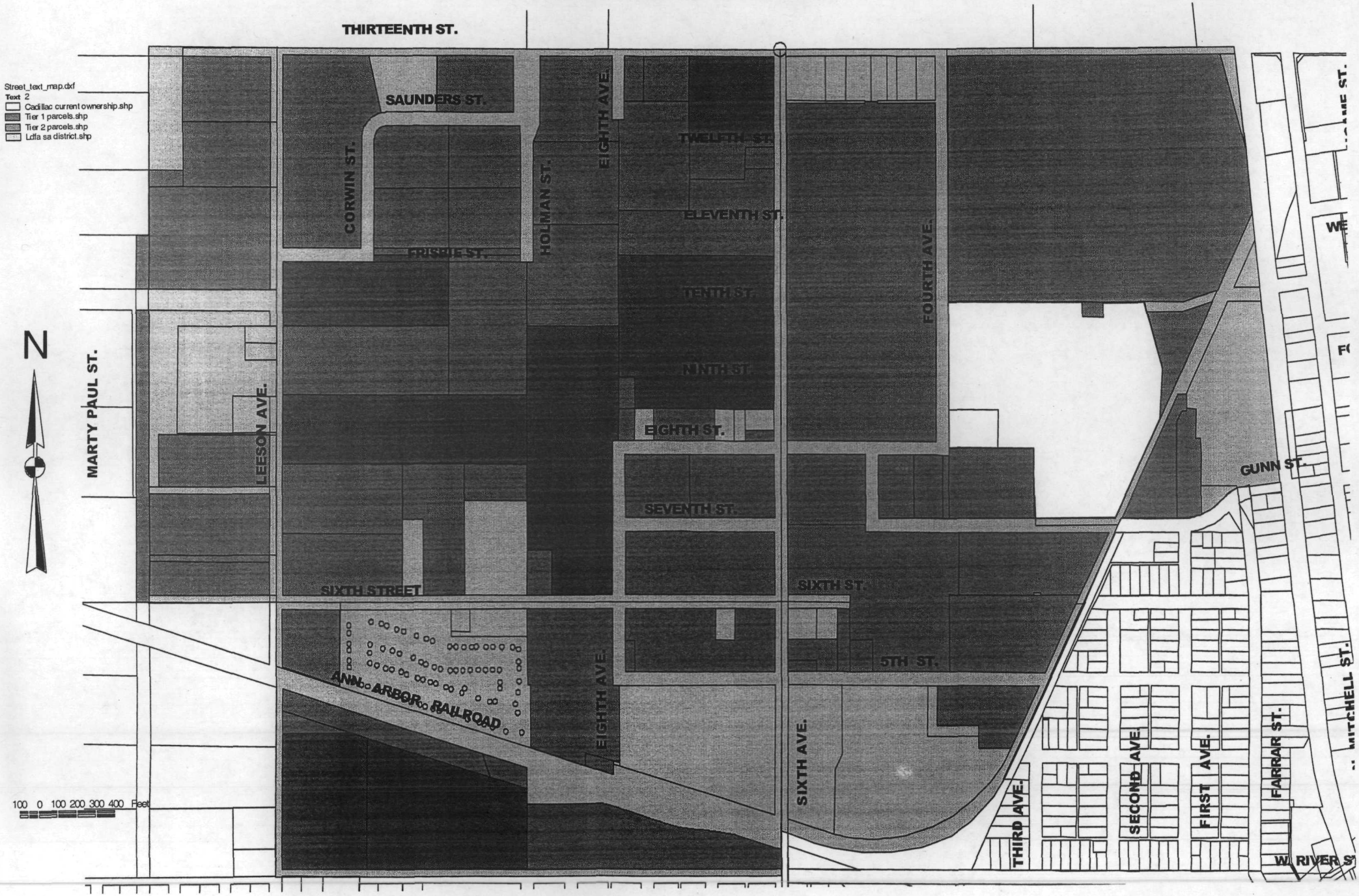
Hours spent in operation and maintenance:

1996	323 hours for four months	2001	770 hours
1997	750 hours	2002	890 hours
1998	580 hours	2003	940 hours
1999	380 hours	2004	970hours
2000	435 hours		



ATTACHMENT 6
DESCRIPTION OF LOCAL DEVELOPMENT FINANCE AUTHORITY (LDFA)

CADILLAC
L.D.F.A. GROUNDWATER CLEAN-UP
SPECIAL ASSESSMENT ROLL



THE CADILLAC LOCAL DEVELOPMENT FINANCE AUTHORITY REMEDIATION PROJECT CITY OF CADILLAC

Population: 10,104

I. CAPSULE SUMMARY -

The City of Cadillac and the industrial firms located in the Cadillac Industrial Park needed to resolve the dilemma of groundwater and soils contamination within the industrial park; however, program costs stood in the way. Thus, the City of Cadillac formed a partnership with the industrial sector and created a financial mechanism to fund the program that would clean up the contamination. First, the City of Cadillac utilized Local Development Finance Authority legislation to facilitate construction of the project. Second, a Special Assessment District was established to finance the annual operation costs of the Groundwater Remediation Facility.

II. NARRATIVE SUMMARY -

In the late 1970's, it was discovered that a number of the industrial firms residing in the Cadillac Industrial Park had improperly disposed of their contaminated waste products. This allowed Trichloroethene (TCE) to enter the ground and subsequently seep into the groundwater under the industrial park.

The Michigan Department of Natural Resources (MDNR) and the Environmental Protection Agency (EPA) became involved and litigation began, not only between the governmental regulatory agencies (MDNR and EPA), but also between the individual industrial firms, due to the joint & several liability scheme associated with environmental contamination issues. One factor that made the process more difficult was the subject of "potential co-mingling plumes of contamination". The dilemma that co-mingling brings about is that the specific source of the contamination cannot be determined because the contaminated waste from different companies has mixed (co-mingled); making it impossible to allocate liability based upon percent of contribution to the overall contamination. Some companies were named Potentially Responsible Parties (PRP) by the EPA, but still it was impossible to accurately establish the limits of each parties' liability. Additionally, some named PRPs had since gone out of business creating "orphan shares" and this litigation reigned with no progress toward clean-up.

The City of Cadillac had an interest in the contamination issue because the City water well field was located almost directly in the middle the Cadillac Industrial Park, where the TCE and other chemical contamination existed. Thus, the City of Cadillac needed to protect its drinking water supply. Also, the City was extremely concerned about the overall impact that the contamination and resulting litigation would have on the future economic vitality of its industrial park(s).

The initial price tag for cleaning up the contamination was about $40 million. Obviously, no single industry could possibly absorb this fiscal responsibility. The City of Cadillac was in the same position as the industrial firms because it could not afford such a high cost to clean-up the contamination. However, by creating a public/private sector

partnership, there was potential to remediate the contaminated groundwater and soils.

The two goals of this partnership was to: 1. remediate the contaminated groundwater and soils; and 2. create a financial vehicle to fund the groundwater remediation project. Thus, the second goal had to be achieved before any type of contamination clean-up could be realized.

The method of funding this project began with utilizing the Local Development Financing Authority (LDFA) legislation. The City of Cadillac established a LDFA District and the projects within this district would fall under tax increment financing (TIF). The tax increment financing legislation allows for the capture of increased property taxes of qualified properties, excluding school operating and school debt millage. The revenue generated by TIF capture can be utilized for public improvement projects within the LDFA District boundaries. However, this particular project was able to capture the school operating millage because it was implemented before the adoption of Proposal A. The specific project that was constructed as the financial catalyst for the whole groundwater remediation program, was the Beaver Power Plant.

The cost of the Beaver Power Plant portion of the program was $58 million. The City of Cadillac, along with its private sector partners, obtained the financing from General Electric for the $58 million required to fund construction of the power plant. The profits of the power plant repay the financing provided by General Electric. Now that wealth had been created that could generate property taxes to be captured by the LDFA, the actual Groundwater Remediation Facility was then able to be constructed.

The City of Cadillac LDFA issued $7.4 million in bonds to finance the Remediation Facility. These bonds paid for engineering & legal fees, the permitting process, and construction costs of the clean-up plant. The TIF revenues which are generated from the power plant development finance 100% of the principal & interest costs of these bonds.

However, now that the Remediation Facility had been constructed, the annual operational costs of the facility needed to be addressed. Thus, the Cadillac Industrial Park was designated as a Special Assessment District to fund the $200,000 annual operating expenses. It was determined that all of the properties that had been identified as contributing to the contamination would collectively be responsible for 75% of the total operational costs and other firms residing in the industrial park would pay the remaining 25% of the operating bill since they would still benefit from the clean-up

remaining 25% of the operating bill since they would still benefit from the clean-up project due to the wide spread nature of the contamination.

The results of the Cadillac Local Development Financing Authority Remediation Project have been very positive thus far. For example, up to date there has been over 300 million gallons of contaminated groundwater treated and cleaned. The current daily average flow is 2.7 million gallons per day. The plant has a maximum flow capacity of 3.0 million gallons per day. Treatment results have been excellent, with all MDEQ permit limits being met with ease.

The benefits of this program have been very positive. The groundwater treatment facility is beneficial to the City of Cadillac and its residents in several ways. First, the City is taking action to protect its drinking water supply, since its well field is located near this area of contamination. Secondly, the economic viability of the industrial park has significantly improved. Contaminated property is difficult to maintain and develop and now that the clean-up is underway, the future viability of this property has been secured. This in turn helps industry retain and expand operations (and job opportunities) in Cadillac.

ATTACHMENT 7
LIST OF DOCUMENTS REVIEWED

ATTACHMENT 7
List of Documents Reviewed

Annual Performance Monitoring Reports, for LDFA: 1997 (FTCH), 1998 (FTCH), 1999 (Tetra Tech), 2000 (Tetra Tech), 2001-2002 (Tetra Tech), 2003 (Tetra Tech), 2004 (Tetra Tech)

Cadillac Area Groundwater Investigation, E.C. Jordan Co., August 1988

Supplemental RI, E.C. Jordan Co., January 1987

Annual Monitoring Report, City of Cadillac LDFA Project, Longshore Environmental Services, Inc.: 2000 (February 2001), 2002 (October 2002), 2003 (October 2003)

Additional Hydrogeologic Investigation Report, Northwest of the Rexair, Inc. Site, Cadillac Industrial Park, Roy F. Weston Inc., February 2002

Record of Decision, Northernaire site, OU1, USEPA, September 1, 1985

Record of Decision, Northernaire/Kysor sites, OU2, USEPA, September 29, 1989

Explanation of Significant Differences, Northernaire/Kysor sites, OU2, USEPA, March 3, 1994

Preliminary Site Close-Out Report, Kysor Industrial Corp., USEPA, September 23, 1996

First Five-Year Review Report, Northernaire Plating Co., September 28, 1995

Second Five-Year Review Report, Northernaire Plating Co., July 26, 2000

First Five-Year Review Report, Kysor Industrial Corp., July 26, 2000

United States of America v. Robert W. Meyer, Jr., Case No. 1:97-CV-526, Declaration of Leah Evison Supporting Plaintiff's Motion for Summary Judgment on Cost Recovery, 9/24/99

United States of America v. Kysor Industrial Corporation, Raymond Weigel, Robert W. Meyer, Jr., and TransPro Group, Inc., Case No. 1:97-CV-526, Declaration of Leah Evison, 6/1/99

Remedial Action Construction Final Documentation Report, Northernaire/Kysor Sites, FTCH, January 1997

Performance Monitoring Summary, Initial 90 Day Operating Summary, FTCH, February 1997

Cadillac Local Development Finance Authority Remediation Project: Summary, via fax on January 18, 2005

On-Scene Coordinator's Report, No. 68-95-007, Northernaire Plating Co., circa 1983

Remedial Action Work Plan, Northernaire/Kysor Sites, FTCH, April 1995

ATTACHMENT 7 (cont'd.)
List of Documents Reviewed

Final Operation and Maintenance Manual, Volume I, Northernaire/Kysor Sites Remediation, FTCH, April 1995

Final Performance Monitoring Plan for Northernaire/Kysor Sites Remediation, FTCH, April 1995

Remedial Design Additional Studies, FTCH, March 31, 1992

Ingraham Property, Remedial Action Report, FTCH, January 1997

Annual Reports to City of Cadillac, Longshore Environmental Services, 2000, 2002, and 2003

MDNR Substantive Requirements Document, MIU990009, Discharge Requirements to Clam River, application submitted on August 29, 1994

Final Discharge Monitoring Permit, MDNR, Discharge Requirements to Clam River, 1996

ATTACHMENT 8
APPLICABLE AND RELEVANT OR APPROPRIATE REQUIREMENTS (ARARs)

ATTACHMENT 8
Applicable or Relevant and Appropriate Requirements (ARARs)

Chemical Specific

- Clean Air Act (CAA) 40 CFR 50.1-6,8,9,11 and 12.

- Michigan Environmental Response act 307 (1982), MCL 299.601 R 299.5101, Type "C" cleanup. Under the MDNR's reading of Act 307, this ROD is to be considered an Act 307 interim remedy, as allowed by R 299.5509. *Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).
  U.S. EPA considers this remedy to be a final remedy for Operable Units I and III.

- Michigan Air Pollution Control Act 348 (1965) Part 2,3,9 and 10. *Part 55, Air Pollution Control, of the NREPA.

Action Specific

- Clean Air Act (CAA), 40 CFR Parts 50, 51

- Federal Protection of Wetlands Act, 40 CFR 6, APP.A

- Michigan Act 203 (1974), Wetland Protection Act. *Part 303, Wetlands Protection, of the NREPA.

- Michigan Shoreland Protection and Management Act 245 (1970). *Part 323, Shorelands Protection and Management, of the NREPA.

- Michigan Act 347 (1972), Soil Erosion and Sedimentation Control Act, MCL 282.101 R 323.1701. *Part 91, Soil Erosion and Sedimentation Control, of the NREPA.

- Michigan Act 348 (1965), Parts 2, 3, 9, and 10, Air Pollution Act. *Part 55, Air Pollution Control, of the NREPA.

Location Specific

- Archaeological and Historic Preservation Act, 40 CFR 6.301(c)/16 USC 469

- National Historic Preservation act, 40 CFR 6.301(b)/16 USC 470

- Historic Sites, Buildings and Antiquities Act, 40 CFR 6.301(a)/16 USC 461-467

- Fish and Wildlife Coordination Act, 40 CFR 6.302(g)/16 USC 1531-1566

- Endangered Species Act, 50 CFR Parts 17 and 402/16 USC 1531-1543

- Protection of Wetlands, 40 CFR 6 (App. A)

- Michigan Endangered Species Act 203 (1974), MCL 299.221 R299.1021. *Part 365, Michigan Endangered Species, of the NREPA.

ATTACHMENT 8 (cont'd.)
Applicable or Relevant and Appropriate Requirements (ARARs)

- Michigan Wetland Protection Act 203 (1979), MCL 281.701 R281.921. *Part 303, Wetlands Protection, of the NREPA.

- Michigan Shoreland Protection and Management act 245 (1970), MCL 281.641. *Part 323, Shorelands Protection and Management, of the NREPA.

- Michigan Soil Erosion and Sedimentation Control act 347 (1972), MCL 282.101 R323.1701. *Part 91, Soil Erosion and Sedimentation Control, of the NREPA.

The following regulations are identified as to be considered (TBC) in the 1992 ROD:

- Occupational Safety and Health Act, 29 CFR 120

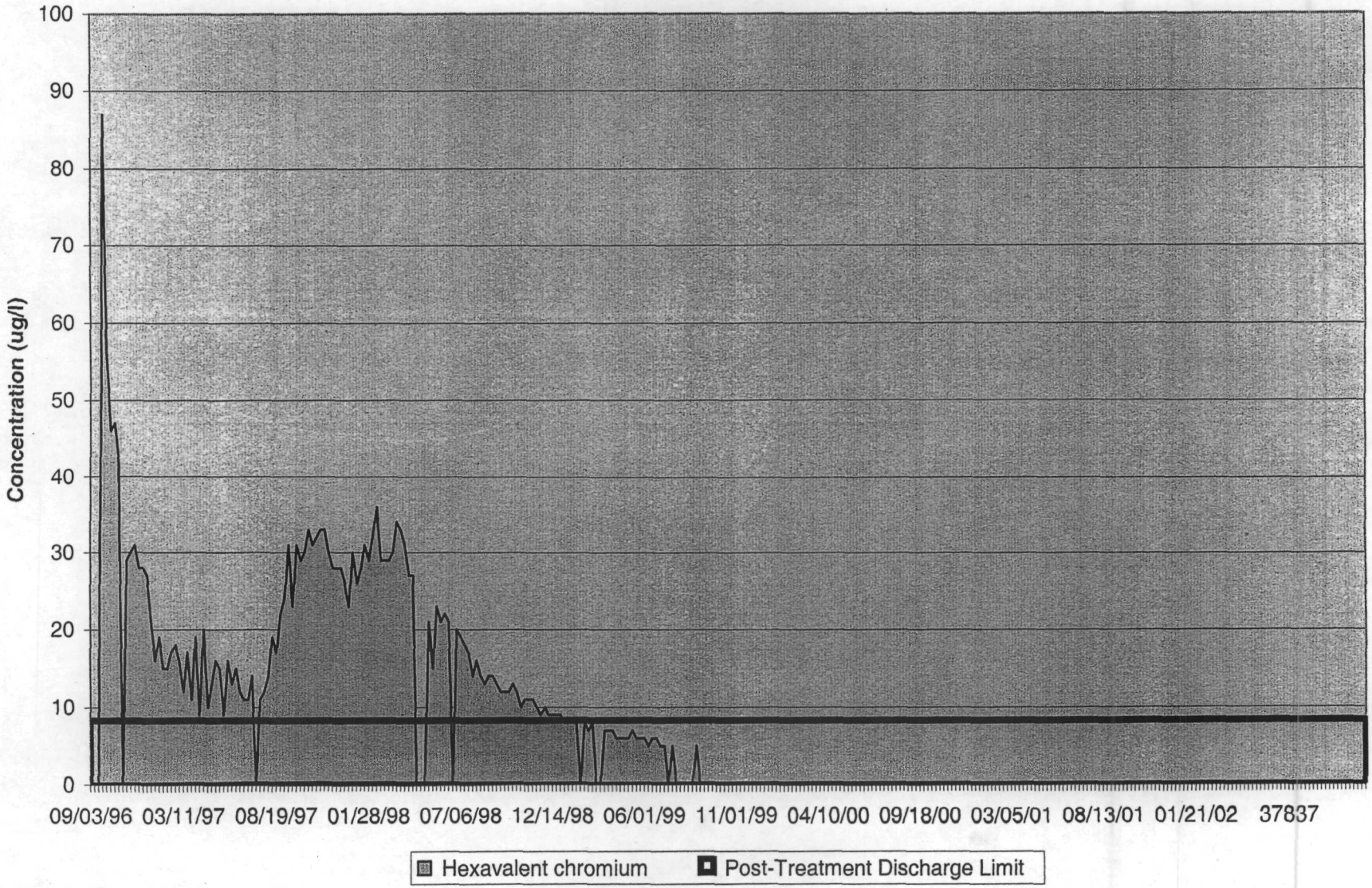
- Michigan Act 154, Rule 3301 (1974), Michigan Occupational Safety and Health Act.

- MCLA 257.722, Michigan Vehicle Code

* Updated citation. While ARARs are frozen at the time the ROD is signed, the MDEQ has indicated that the citations for some state ARARs (*) can be updated without changing the statutes. For example, the citation for Michigan Environmental Response act 307 (1982) can be updated to Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). When the Natural Resources and Environmental Protection Act (Act 451) was adopted in 1994, it simply consolidated state environmental statues, but did not change them. Thus, Act 307 became Part 201 of Act 451 but nothing that was in Act 301 changed. However, revisions to Part 201 did come later (1995).

ATTACHMENT 9
GRAPHS

Hexavalent Chromium in I-5 Influent

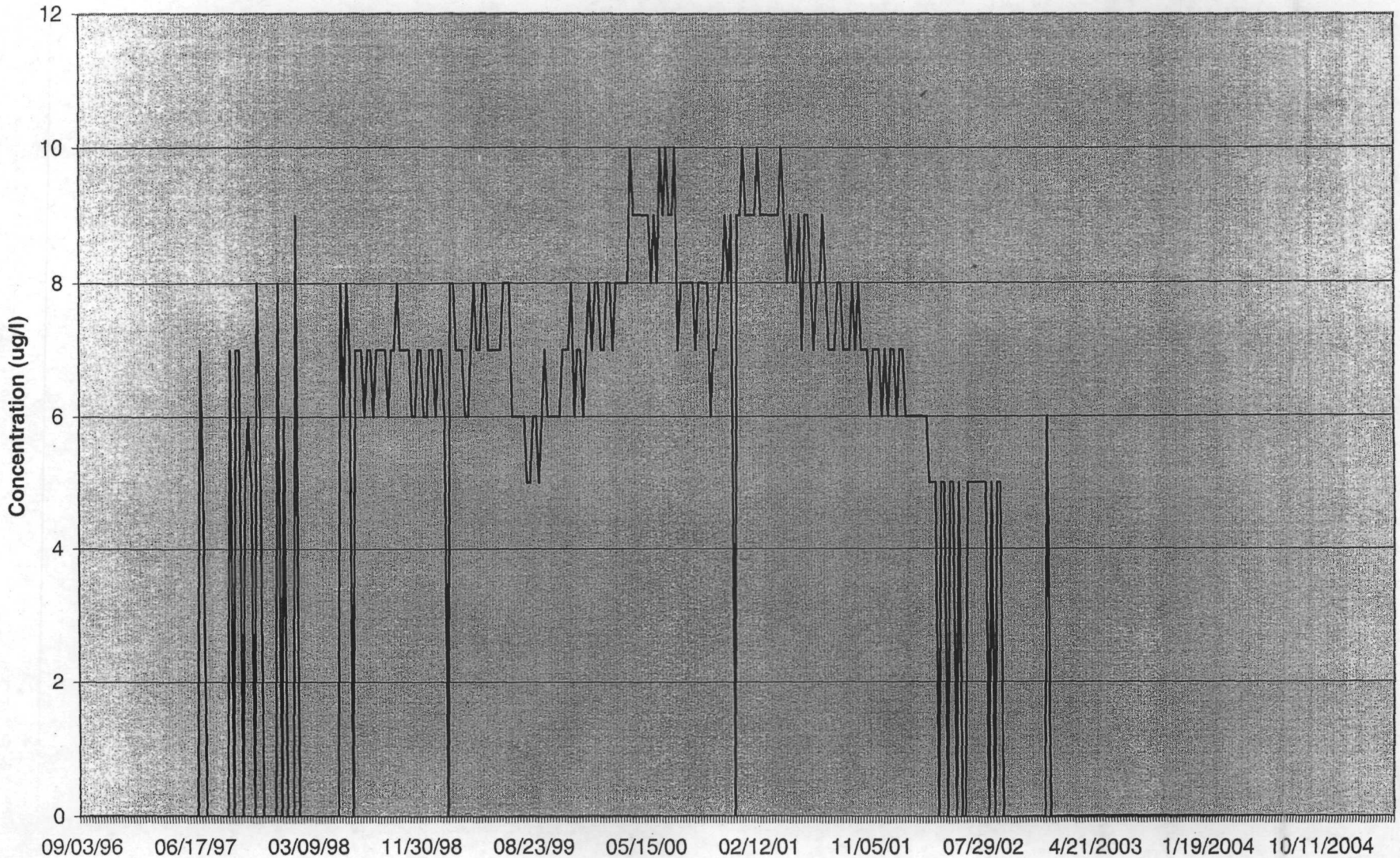


Graph 1

9/25/2005

graph 09 I-5 influent hex chrome + limit

Hexavalent Chromium in Discharge from Treatment Plant

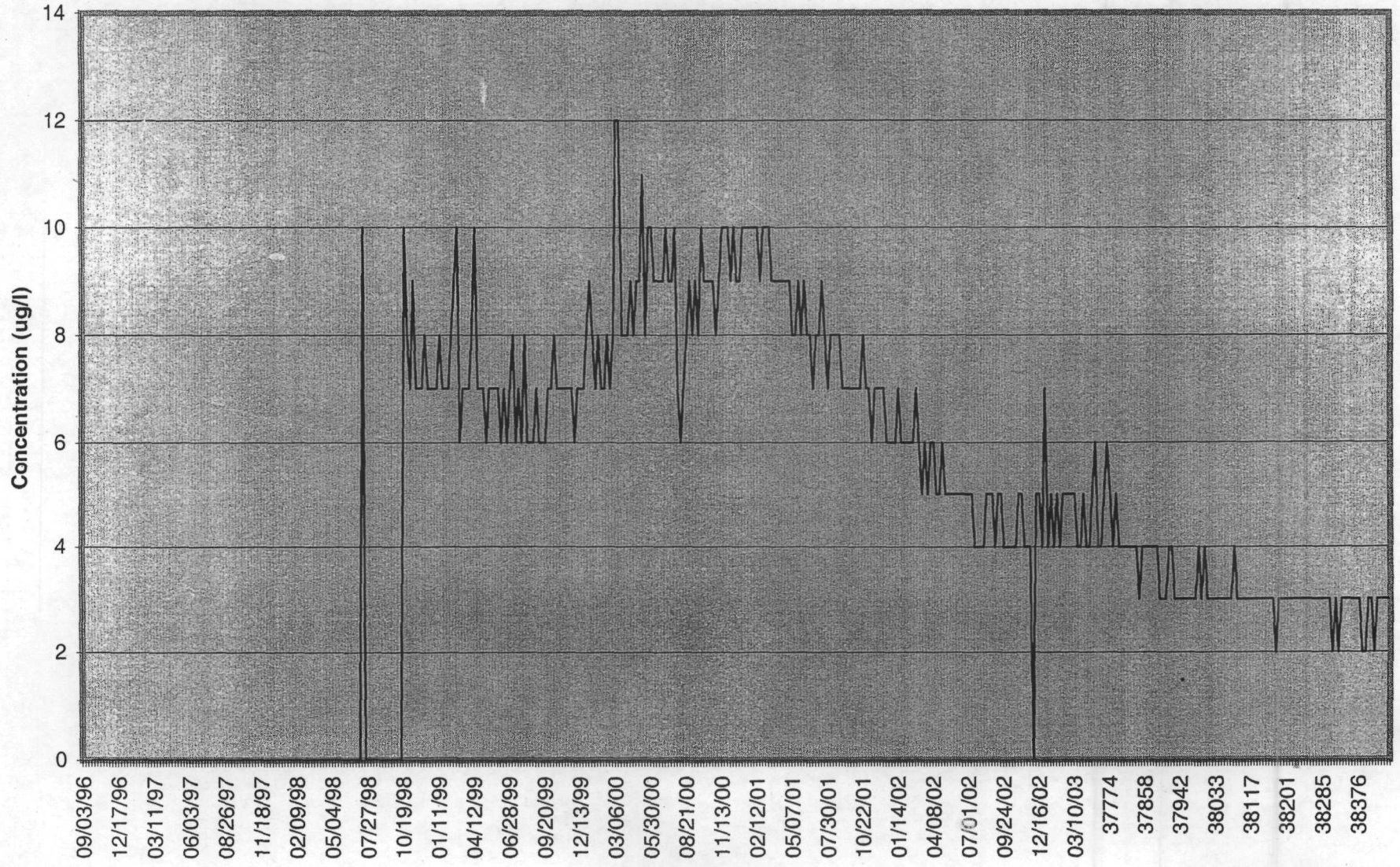


Graph 2

9/25/2005

graph 01a discharge hex

Total Chromium in Discharge from Treatment Plant



Graph 3

9/25/2005

graph 04a discharge total

ATTACHMENT 10
SITE INSPECTION CHECKLIST

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

I. SITE INFORMATION

Site name: NORTHERNAIRE/KYCOR	**Date of inspection:** APRIL 26/27, 2005
Location and Region: Cadillac, MI, R5	**EPA ID:** MID043681840 (Kysor) MID020883609 (Northernaire)
Agency, office, or company leading the five-year review: U.S. EPA	**Weather/temperature:** Sunny, 50°

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other SVE

- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** LARRY CAMPBELL (Name) UTILITIES DIRECTOR (Title) 4/27/05 (Date)
   Interviewed ☒ at site ☒ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached Carbon disconnected (ag. carbon) (for Cr) → petitioned to stop feeding and adjustment; No other problems; proactive maintenance; NaOH/sulfuric acid emptied in 2000

2. ~~O&M staff~~ PETE STALKER (Name) CITY MANAGER (Title) 4/27/05 (Date)
   Interviewed ☐ at site ☒ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____
   ~~telemetry (radio-based) used to be interrupted by semi-truck which was blocking signal~~

Routine Maintenance
oil; check belts; check packing, heat tape, check for freezing; coal dust from next door clog up roof-top heating unit (for bldg heat)

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual - office & plant	☒ Readily available	☐ Up to date	☐ N/A
☐ As-built drawings " "	☒ Readily available	☐ Up to date	☐ N/A
☐ Maintenance logs LDFA	☒ Readily available	☐ Up to date	☐ N/A

Remarks Daily bench logs // Daily = all @ LDFA

2. **Site-Specific Health and Safety Plan** ☑ Readily available ☐ Up to date ☐ N/A
☐ Contingency plan/emergency response plan ☑ Readily available ☐ Up to date ☐ N/A
Remarks RMP = Risk Mgmt Program = Utilities Office

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☐ N/A
Remarks OSHA training at plant (in-house)
• 8 hr incident responder training

4. **Permits and Service Agreements**
☐ Air discharge permit ☑ Readily available ☐ Up to date ☐ N/A
☐ Effluent discharge/NPDES ☑ Readily available ☐ Up to date ☐ N/A
☐ Waste disposal, POTW ☑ Readily available ☐ Up to date ☐ N/A
☐ Other permits ☐ Readily available ☐ Up to date ☐ N/A
Remarks Waste mgmt permit fee = haven't disposed any waste yet

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☐ N/A
Remarks

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☐ N/A
Remarks

7. **Groundwater Monitoring Records** ☑ Readily available ☐ Up to date ☐ N/A
Remarks Recent records in Larry's office; historical data at LDFA

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☐ N/A
Remarks

9. **Discharge Compliance Records**
☐ Air ☐ Readily available ☐ Up to date ☐ N/A
☐ Water (effluent) ☑ Readily available ☐ Up to date ☐ N/A
Remarks

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☐ N/A
Remarks Locked bldg; locked fence.

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons:
Replacing valve
Well failures/may have to replace pump

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☐ N/A
Remarks SVE fenced; wells in pits below grade/locked

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
Remarks

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☐ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____

Frequency Large production wells/drinking wells | Drinking wells

Responsible party/agency City of Cadillac MDPH

Contact _____ Victoria ~~Weisel~~ Wietzel

Name	Title	Date	Phone no.
Larry Campbell			231.775.9942

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks Would like to see City ordinance to cover entire city but not realistic.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks _____

2. **Land use changes on site** ☒ N/A

Remarks New industrial fac

3. **Land use changes off site** ☐ N/A

Remarks New industrial facilities in area (but same use)

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☐ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches ☐ Applicable ☐ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

C. Letdown Channels ☐ Applicable ☐ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☑ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks_____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A
   ☐ Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   ☐ Erosion not evident
   Remarks_____ N/A

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks_____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent_____ Depth_____
Remarks_____

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☐ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent_____ Depth_____
Remarks_____

2. **Performance Monitoring** Type of monitoring_____
☐ Performance not monitored
Frequency_____ ☐ Evidence of breaching
Head differential_____
Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks one shallow well not op (S7)
S1/S2 powered by bldg

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks ~~17~~ - direct pipeline to plant
17 ioh enter via same pipeline

3. **Spare Parts and Equipment**
☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Collection Structures, Pumps, and Electrical**
☒ Good condition ☐ Needs Maintenance
Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks_____

120v - ~~replaced~~ w
480 ~~phase~~ volt 3-phase } pumps } wellhead
btw stripper towers } doc's } Kysor bldg.

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks_____

C. Treatment System ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
☒ Metals removal ☐ Oil/water separation ☐ Bioremediation
☒ Air stripping ☒ Carbon adsorbers
☐ Filters_____
☐ Additive (*e.g.*, chelation agent, flocculent)_____
☐ Others_____
☒ Good condition ☐ Needs Maintenance
☒ Sampling ports properly marked and functional
☒ Sampling/maintenance log displayed and up to date
☒ Equipment properly identified
☐ Quantity of groundwater treated annually ~2.7 million gal/day (check budget doc)
☐ ~~Quantity of surface water treated annually~~_____
Remarks Check ROD for shut-down criteria for chrome trtmt.

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☒ Good condition ☐ Needs Maintenance
Remarks_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☒ Good condition ☒ Proper secondary containment ☐ Needs Maintenance
Remarks_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☒ Good condition ☐ Needs Maintenance
Remarks_____

5. **Treatment Building(s)**
☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair
☒ Chemicals and equipment properly stored
Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks_____

D. Monitoring Data

1. Monitoring Data
☒ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
☒ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Well maintained system

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs. that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.